The OIL WEEKLY

Oil and GAS ENGINEERING

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THE WEEK'S NEWS INTERPRETED

OCT 19 1944

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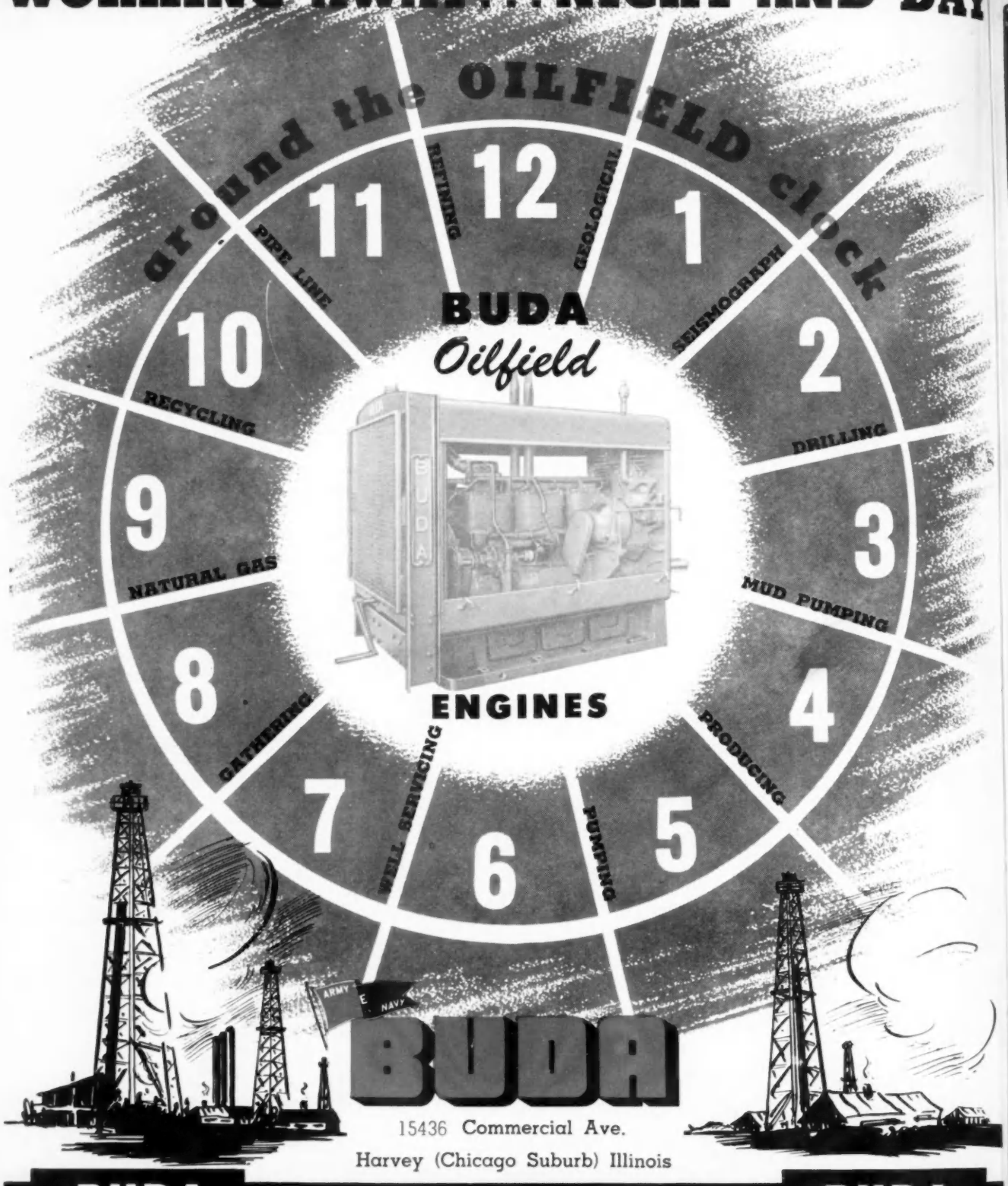

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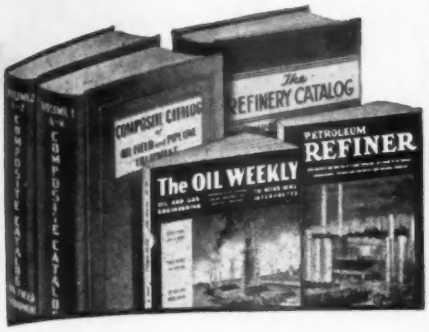

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The OIL WEEKLY and The COMPOSITE CATALOG for the drilling-producing-pipeline industry

PETROLEUM REFINER and The REFINERY CATALOG for the refining-natural gasoline industry

THE OIL WEEKLY

ENGINEERING • NEWS • STATISTICS

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LOOKING AHEAD
... with the Editor

FAILURE to understand the effect of tension upon drill pipe and tubing can result in costly experiences. The rule of thumb method of estimating the amount of weight of a string of pipe has been responsible for many junked holes in the history of the oil industry.

Knowledge of the limitations which should be placed on pipe in tension ought to be part of the qualifications of all men in the operating branch of the industry, and should be required of all drillers, tool pushers, fishing-tool men and engineers.

What is meant by "elastic limit," and "yield point" of pipe should be thoroughly understood by anyone charged with the responsibility of drilling, operating, or maintaining an oil well.

In an early issue, an article will be presented by Joe L. Ward, Jr., author of the treatment on heaving shale which appears in this issue of THE OIL WEEKLY, (page 58) will present in a simple, understandable manner, the few fundamental laws of strengths of materials in pipe and tubing. Included will be formulae which can be used to calculate tensional properties of pipe when tables are not available.

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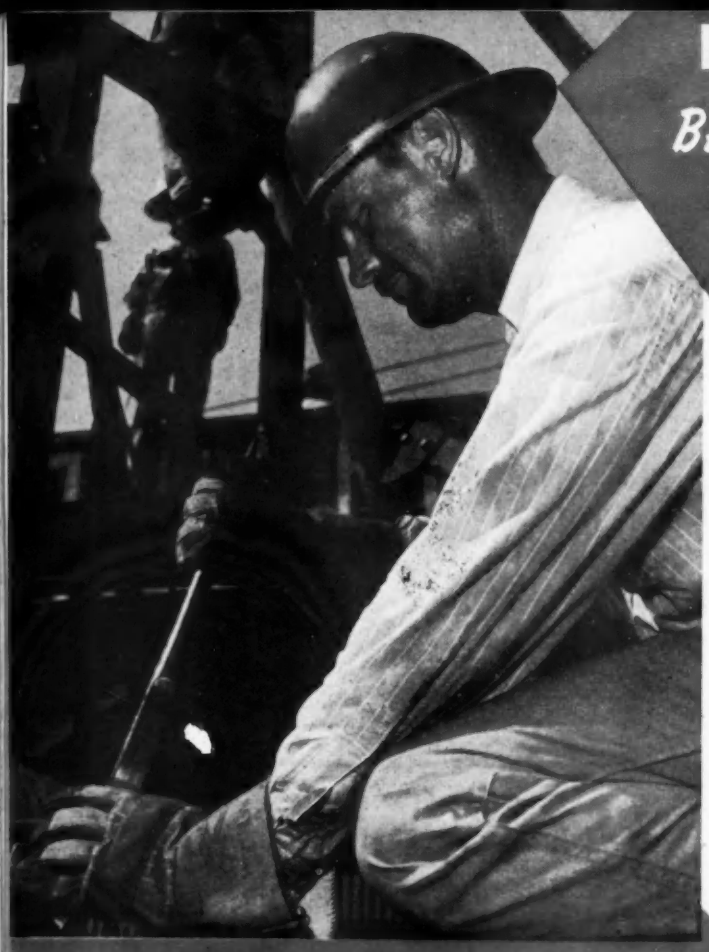

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The Changing Panorama

U. S. Production Worries Not Over

THE end of the German war will not result in a decline in requirements for United States crude, according to recent statements of the PAW Washington staff. They say needs of the military in fighting Japan are likely to require as much crude as has been needed in fighting both Germany and Japan. This is a matter of great importance.

In the first place it is contrary to general opinion of men in the industry, perhaps because it is different from the opinions expressed by several oil industry economists and oil trade publications. But of greater significance is the prospect that the nation's output of crude must be maintained at its current peak for perhaps another year or more. This means the industry's oil production worries will not be alleviated but will continue or even become more acute as time passes and excessive rates take their toll of ability to produce.

PAW foresees actual consumption of petroleum by military services in the interim between the defeat of Germany and the defeat of Japan as probably somewhat smaller than currently, but warns that information from the Army and Navy indicates higher quality petroleum products will be wanted. For instance, aviation gasoline probably will be advanced from its present 100-115 octane to 130 to accommodate the big new bombers that will be used extensively against the Japanese. This improvement in quality, they say, plus greater distances in the Pacific, will require the same amount of crude, although actual military consumption of products may be slightly less.

It is anticipated that there may be a temporary slump in military consumption and therefore in crude requirements during the period when men and materiel are being shifted from Euorpe to the Pacific. However, PAW apparently fears the industry will not recognize this as merely a temporary condition.

As far as the gasoline supply for civilian motorists is concerned it is probable that in making the higher quality petroleum products, refiners will of necessity manufacture motor fuel-grade gasoline in sufficient quantities to give motorists more gasoline.

AVOID USELESS WRAPPINGS! ★ ACCEPT SIMPLER PACKAGING!
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PACKS A WAR PUNCH!
FIGHT WASTE!
★ SHARE THE PRINTED WORD! ★ MAKE EACH PIECE STRETCH! ★

Gas Regulation by States Needed NOW

THE feeling that control of any state's natural resources should be exercised by the state itself is shared by the oil industry as a whole and by the state regulatory bodies. Considerable fear had been felt and expressed as to the possibility that the PAW's wartime powers of regulation will not be returned to state authorities upon the close of the war.

As far as PAW itself is concerned, we feel it is doing everything in its power right now to relax its restrictions so operators may have as much as possible of their prewar freedom of action. This is particularly true as regards strictly OIL operations, since regulatory bodies in most important oil-producing states have full powers under the law to control adequately oil activities and output.

Such powers do not always apply to gas and distillate wells. During the emergency period, the PAW, through control of materials, has managed to keep drilling in gas-condensate areas within reasonable limits.

Texas is an important case in point. It has supplied much authority in these areas which the state regulatory bodies have lacked because of their limited authority under existing gas statutes.

The need for proper development of gas-condensate pools is recognized by the industry, and it behooves the people of the interested states to see that proper legislation is enacted to take care of the situation upon termination of the PAW authority.

Senator from Iowa Howls in the Dark

SENATOR Guy M. Gillette of Iowa, perennial antagonist of the oil industry, charges the industry has conspired to take the synthetic rubber industry away from alcohol. As a member of the farm bloc, the Senator of course is interested in boosting the market for grain. Basis for his charge of conspiracy comes from orders by the rubber administrator that production of butadiene from petroleum be stepped up during the fourth quarter. The Senator further intimates that the oil industry is curtailing gasoline deliveries for benefit of aggression in the rubber matter.

What the Senator has overlooked is that the oil industry did not seek and does not know if it wants the synthetic rubber business. Total demand for the ingredient the industry can supply for that purpose is so small a part of the industry's volume that it is of little consequence. Plants which have been built to make rubber ingredients were erected under government urging as a part of the war effort, and the oil industry contributed largely and eagerly of its technical talent toward perfecting processes for making synthetic rubber—whether grain or petroleum is the starting point. It was apparent during the construction period that preference was given the alcohol plants while petroleum plants waited for materials. The fact that grain has a farm bloc in Congress and oil does not, may have had something to do with that.

Now that the plants are built, petroleum plants have not been working at capacity because alcohol has been carrying the load. Economics have been laid aside because by making less butadiene the oil industry can make more aviation gasoline. This will not continue always. After the war, synthetic rubber will be made from the cheapest ingredient available unless there is more government interference than is hoped for. When that happens, alcohol from grain will have small chance against sugar refuse as a source of alcohol. Or it might be that petroleum will supply alcohol—and it can make ethyl alcohol more cheaply than it can be made from grain at the price the farmer wants.

Alcohol has been available for making rubber at the expense of the beverage business. Makers of alcohol would pre-

65,000 Ships Built By Navy in 5 Years

Task Force 58 Was Mere Zephyr to What Is Coming, Navy Warns Nipppon.

By Associated Press.

Washington, Aug. 30.—Navy Secretary Forrestal reported Wednesday that the United States, "the greatest naval power on earth," has built 65,000 vessels of all types in the last five years.

He said the giant armada of new craft represents 9,000,000 tons of naval shipping. Of the total tonnage, about 36 per cent is war-22 per cent landing craft and remainder auxiliaries and other types.

serving their thirty-first anniversary Wednesday, Forrestal said they experienced one of the greatest spurts in naval history. He added that although 57,600 planes were dclivered in the five-year period and that the total number now on hand is 20 times greater than at the beginning of the European war, "the navy aircraft production job is far from com-

Get Planes Rapidly.

Recently, he said

Post-war, look to Levingston for the finest in all-welded steel tugs and barges for marine transportation of petroleum and petroleum products.

One of the Scores of U.S. Navy Rescue Tugs Built by **LEVINGSTON**

SHIPBUILDING COMPANY

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fer to get back to their own business. Because of its cheapness, butadiene from petroleum probably will be used for rubber after the war. But so far as seeking to take something away from the farmers—the oil industry was asked to make butadiene and has been too busy with that and other war emergencies even to find out if it will want the business permanently.

World Oil Treaty Opposition Unanimous

A SERIES of important meetings have been held by varied branches of the industry during the past month. And all have had one thing in common—strong oppositon to the Anglo-American oil agreement. Only in one instance did these meetings fail to adopt vigorously-worded resolutions denouncing the agreement as faulty and highly detrimental not only to the welfare of the American oil industry, but to the whole American social, industrial, economic and governmental systems. Opposition to the agreement is almost unanimous within the industry.

Only one of the five oil groups to hold meetings during the past month that did not endorse a resolution opposing the agreement was the Petroleum Industry War Council. A strong attack on the agreement was made before PIWC, but it was referred to one of the council's committees for further study.

The meetings have included: statewide monthly hearing (September) of the Texas Railroad Commission; annual convention of the American Association of Oilwell Drilling Contractors; monthly meeting of the Petroleum Industry War Council; quarterly meeting of the Interstate Oil Compact Commission; and the annual meeting of the directors of the Independent Petroleum Association of America.

At the Interstate Oil Compact Commission meeting two resolutions opposing the treaty were adopted, one by representatives of oil-producing states acting officially as the Compact Commission, and the other an impromptu resolution unanimously adopted by oil operators attending the Compact sessions.

A plastic auxiliary gas tank of 100-gallon capacity is so light in weight that a man can hoist it easily to his shoulder. The tank is now in use as a "spare" for gasoline for our lighter-than-air craft on patrol over American waters. In spite of the light weight, the tank is extremely strong with a hard surface impervious to the effects of high-test aviation fuel.

Congressmen Learn Business Problems

IN ITS NEED to tell Congressmen about many of its problems, ranging from crude oil prices, to the Anglo-American oil treaty, to fear of permanent federal control, the oil industry might encourage the calling of "Meet Your Congressman" meetings. This program, sponsored by the Chamber of Commerce of the United States, will result in many meetings now that many Congressmen have returned home for a preelection vacation. It is certainly the opportune time to hold them.

In six weeks, it is reported, the program has caught the popular fancy and is producing "a new understanding and appreciation of the problems confronting industry and the necessity for a closer cooperation between it and our Congressional representatives."

Under the plan, meetings are arranged between businessmen of the community and candidates for election to Congress. Formality is discarded in favor of round-table chats and a frank exchange of ideas. Congressional candidates are not invited to speak, but rather to listen to the problems of businessmen and give counsel and advice.

So far 159 such meetings have been held in various parts of the country, and the program is to be stepped up now that Congress is no longer in session. Businessmen should take full advantage of these meetings.

"Divide and Destroy" Threat Forestalled

WE WERE fearful for a moment last week during the meeting of the board of directors of the IPAA at Dallas, that there might be action taken which would proclaim to Washington that the oil industry is divided and that one part of it was willing to throw another part to the wolves to gain a needed increase in the price of crude oil. Fortunately, a motion which would have had the effect of dividing the industry failed, if only by a narrow margin.

We do not believe that all of those who favored the proposition which we felt would have meant division realized that they were about to do something which probably would have meant trading a birthright for a mess of pottage. Nor do we impugn the motives of those who lead the movement. We think that they were following a mistaken course and that instead of getting a price increase for the producer, they would have given courage to the man who, in the final analysis, is responsible for the price of crude oil being as low as it is—Mr. Roosevelt.

We believe that most of those present at the meeting have a genuine fear that the federal government will attempt to continue some form of control over the oil industry after the war. We believe that most of them felt that the measure of control which may be attempted will depend upon how strong the administration feels its position will be. We believe these things because resolutions adopted with no dissenting votes proclaimed that the directors of IPAA felt just as we have indicated.

What some IPAA directors overlooked was the absolute certainty that if government control is continued, it likely will not be applied to refineries and major companies alone. The independent producer cannot hope to be exempted. Some of the directors forgot that. Some of them believed statements to the effect that the major companies have made no effort to help get an increase in the price of crude oil. Such statements were in error. THE OIL WEEKLY has published public declarations by some of the major companies urging that the price of crude be raised. To interested parties we shall be glad to furnish the dates on which they were published.

The strategy of "divide and then destroy" is not new. We hope that the oil industry will not be sucked into such a position.

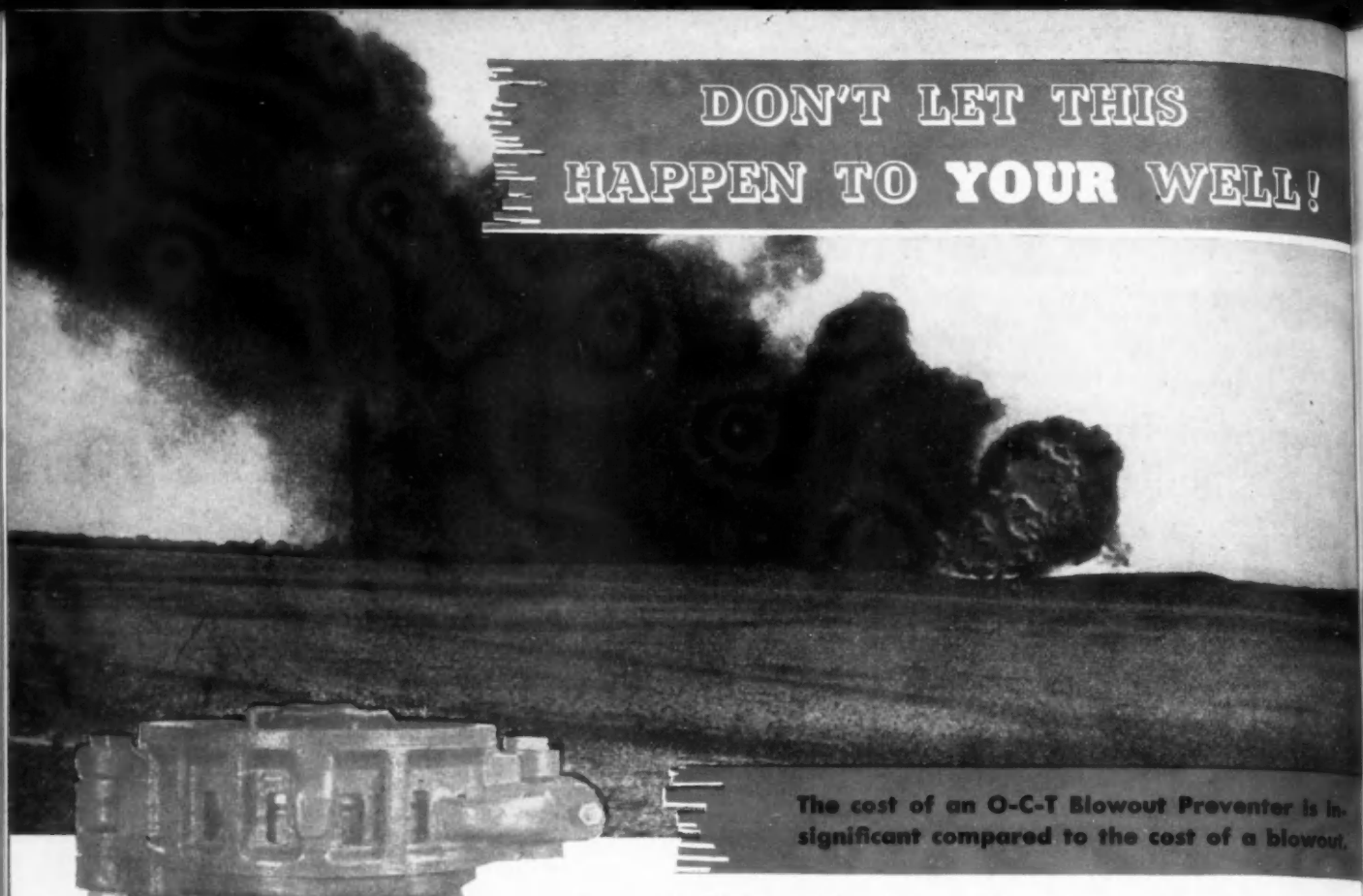
A Useful Watchdog

ONE must not be too enthusiastic about encouraging continuation of any federal agency when the industry generally opposes all forms of government control. Nevertheless, it appears the Connally Hot Oil Act and its enforcement agency, the Federal Tender Board, has benefited the industry as a whole, and that it can continue to do so.

Therefore, it is surprising that a move appears to be under way to get the Senate to cut out the appropriation for operation of the board. Appropriations have been approved for years but there is doubt about the next allotment because some oil men are urging Senators to refuse to appropriate funds. One cannot help but wonder as to their motives.

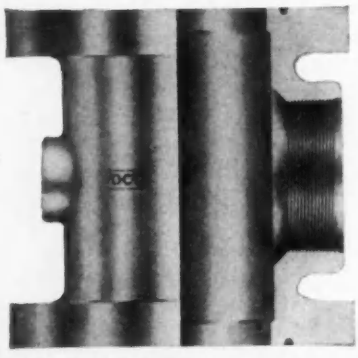
No doubt the Federal Tender Board in East Texas has too large a staff and it makes entirely too many unnecessary reports. But a small staff would serve the industry as a useful "watchdog" against hot oil. The fact you do not have any burglaries when a watchman is on the job is no indication that burglars do not exist.

DON'T LET THIS HAPPEN TO YOUR WELL!



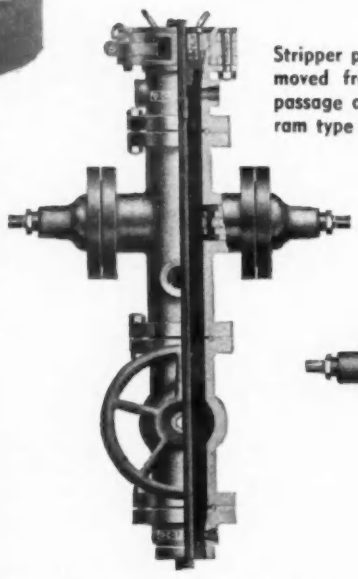
The cost of an O-C-T Blowout Preventer is insignificant compared to the cost of a blowout.

O-C-T Blowout Preventers, equipped with regular packoff are used above ram type preventers to provide an all-important secondary seal and to relieve the ram packers of wear while working pipe under pressure to prevent sticking. The illustrations at right show the use of the interchangeable stripper type packoff.

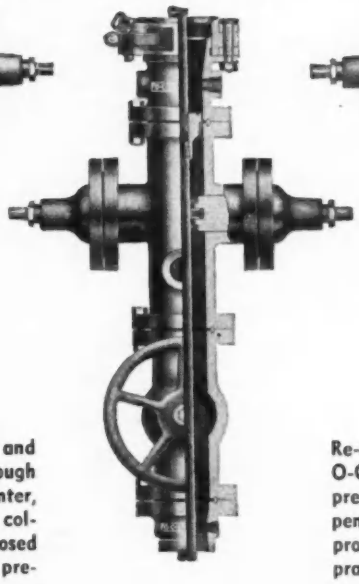


The O-C-T Mud Cross illustrated above is recommended for the drilling control hook-up to facilitate the return flow of mud from the well and to prevent mud flowing over the top blowout preventer.

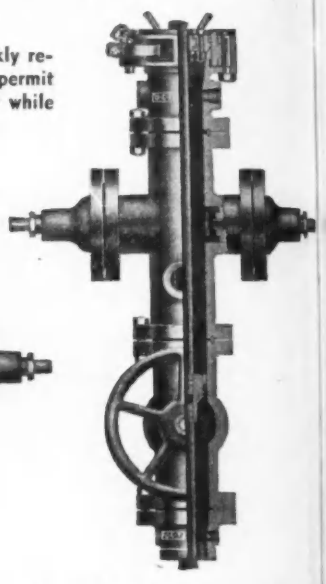
Illustrating Use of O-C-T Stripper Type Blowout Preventer for Running and Landing Casing or Tubing.



Stripper pack-off is easily and quickly removed from O-C-T Preventer to permit passage of casing or tubing hanger while ram type preventer is closed.



Open ram type preventer and run pipe to bottom through O-C-T Stripper Type Preventer, which readily passes pipe collars. Thus, no wear is imposed on packers of ram type preventer.



Re-insert stripper type pack-off in O-C-T Preventer, open ram type preventer, and lower hanger to suspension point . . . thus, maximum protection against blowouts and practically no wear on ram type preventer.

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WASHINGTON ROUNDUP

By BERTRAM F. LINZ, Washington Correspondent

DISCLOSURE by PAW that it is cutting its force as rapidly as improving conditions permit, preparatory to closing its door as soon as possible after the end of the war, marked an otherwise quiet week in Washington oil circles.

PAW Cuts Staff—PAW revealed that in the past 15 months it has cut its staff by 20 per cent and indicated that further contraction would follow the consummation of the various objectives at which it has been aiming.

Postwar Refinery Projects—Another postwar note was the report, also from PAW, that the oil industry has plans to spend more than $350,000,000 following defeat of Germany in the construction of new refinery facilities in this country and abroad.

100-Octane Catches Up—Production of 100-octane aviation gasoline this month for the first time will exceed requirements (see page 75) and PAW is preparing to build up needed inventories and undertake volume production of the new super-aviation fuel which is expected to play an important part in the Pacific war.

Export Procedure Changed—The Foreign Economic Administration has announced a new procedure covering the export of maintenance, repair and operating materials for the foreign oil industry.

Supreme Court Cases—The Supreme Court will determine whether the unrecovered cost of equipment transferred with the sale of a lease is deductible from the cash consideration in computing the gain or must be recovered through the depletion allowance applicable to production where an interest in the oil is reserved, but by refusing to review the issue. In effect affirmed a lower court decision holding the transfer of a lease for a cash consideration with the assignor retaining an interest in the production is a sublease and the profits taxable as ordinary income.

Government Offering Rigs for Sale; Delay Seen in Real Estate Surplus

Defense Plant Corporation shortly will invite bids for the sale of three rotary drilling rigs used by the Army in its abortive quest for oil in New Zealand, which have been declared surplus by the War Department. The rigs, stored in the San Bernardino, California engineer depot, will be sold to the highest bidders who also will be given an opportunity to purchase tubular goods, also held by DPC as surplus, with which to put them to work immediately.

Secretary of Commerce Jesse Jones reported that all but nine of the 378 operators of government-owned war plants have responded to his telegraphic inquiry as to whether they were interested in negotiating for the purchase or lease of the 586 plants they are operating.

An interest in leasing or purchasing —mostly leasing—was indicated by 252 contractors operating 325 plants, Jones said, while 39 contractors operating 55 plants stated they would not be interested in either buying or leasing and 78 contractors operating 120 plants said they have not yet reached decisions. Preliminary discussions already have been started with a few of the contractors, he said.

W. L. Clayton, surplus war property administrator disclosed that no real estate and only a few miscellaneous buildings and a limited amount of plant equipment have been sold, the sale of real estate having been suspended until the surplus property board is set up under the new surplus property act.

Other quarters pointed out that months probably will elapse before anything can be done toward disposing of surplus oil-bearing and other lands, the general view being that the new board, not yet appointed, will require at least three months for organization, study and development of procedures. Further delays are seen in the provisions of the law requiring the board to give original owners, their heirs or their tenants, an opportunity to re-purchase the properties before disposing of them to others, and there are a number of stipulations in the legislation which may lead to other difficulties.

Tank Car Order

The Office of Defense Transportation last week took cognizance of the West Coast situation in orders prohibiting the use of tank cars of less than 7000-gallon capacity for rail shipment of petroleum products into District 1 and for all liquid products to the Pacific Coast, except by permit.

Effect of the order, it was explained, will be to restore a similar order formerly in effect on the Eastern Seaboard and relieve congested West Coast terminals.

Internal Revenue Warns Against Bonus on Profits

Oil companies which have government contracts subject to renegotiation were warned last week in an Internal Revenue decision that the payment to employes, prior to renegotiation of commissions of bonuses based on profits, sales or contract price may be in violation of the salary stabilization act in the event renegotiation results in reduction of profits or contract prices.

The bureau cited two ways in which such payments might become in contravention of the act under which excessive compensation paid may be excluded from a company's cost deductions in computing income and profits taxes.

In one instance a company entered into an agreement, paying a man $40,000 on the basis of a $400,000 profit which after renegotiation was reduced to $100,000. In the other, a company agreed to pay its sales manager 2 percent of the dollar value of sales to the government under a war contract, in addition to his salary, paying him $50,000 on the basis of sales amounting to $2,500,000 at prices which upon renegotiation, were reduced 40 per cent to eliminate excessive profits under the contract. In both cases, the Bureau warned, the payment of the compensations specified would be in violation of the act. However, the Bureau said, all such cases coming before the regional offices of the salary stabilization unit are to be examined to determine whether extenuating circumstances existed at the time the bonus payments were made for the purpose of determining the extent to which, and the conditions under which, such payments may be approved.

Surplus Army Equipment May be Bought By Oil Operators Certified Through PAW

Used Army trucks and other transportation equipment are being disposed of by the procurement division of the Treasury Department. Although available only through registered automobile dealers, and for essential use only, an attempt is being made to get some of the items for petroleum operators.

Government agencies have first call on these vehicles, after which they are available to the public. Establishing the essentiality of their intended use is necessary to purchase.

Subject to PAW certification, petroleum operators can participate at these Treasury Department sales, and through their selected dealer can have preferential treatment.

Operators can qualify through local offices of PAW, either verbally or by letter. PAW will then establish the requirement and confirm a certification, which will be used by the operator's automobile dealer as evidence to the Treasury Department for eligibility to qualify as representing a government agency's need.

Dealers having filed letters of certification will have an opportunity to make purchases for essential users and the remaining units, if any, will be sold to eligible dealers.

Sales will be consummated on the spot by a representative of the procurement division. Purchasers are requested to be prepared to make payment in full by cashier's check, certified check, or postal money order made payable to the Treasurer of the United States.

Right is reserved to limit the number of vehicles purchased.

Sales held recently have included passenger cars, motorcycles, command cars, miscellaneous trucks, sedan-passenger cars, station wagons, coupe-passenger cars, weapon carriers, and ambulances.

It is understood that much of this equipment is in good condition and is ready to be put into immediate use. As the war nears its climax, more equipment surplus will be sold by the government.

Connections Sought With New Tennessee Gas Line

The Federal Power Commission on October 19, in Washington, will hear applications of three gas companies for authority to construct facilities to connect with the Tennessee Gas and Transmission Company's Texas-West Virginia pipeline scheduled for completion within the next few weeks.

Included in the consolidated proceedings are the applications of the Kentucky Natural Gas Corporation for 18 miles of 16-inch pipe line from Russellville, Kentucky, to the new line; Louisville Gas and Electric Company for 62 miles of 8-inch and 3 miles of 12-inch pipeline from Louisville, Kentucky, to a Calvary, Kentucky connection and Tennessee Natural Gas Lines, Inc., for 17 miles of 10¾-inch pipeline between Ashland City and Nashville, Tennessee.

Short-cutting the usual procedure in the interest of saving time and permitting an early decision, the Commission has announced that the filing of briefs on applications of the Memphis Natural Gas Company for authority to construct additional facilities in Arkansas, Mississippi and Louisiana, and oral arguments would be heard in Washington October 16.

Involved in the case is the company's petition for reconsideration of the order dismissing its application for construction of three 16-inch pipe lines aggregating approximately 61 miles, parallelling the unlooped portion of its line in Chicot County, Arkansas, and Bolivar, Coahoma and Tunica Counties, Mississippi, and an application for a 50-mile 20-inch line between Ouachita and Claiborne Parishes, Louisiana.

Supreme Court Decides to Consider Two Oil Cases

The Supreme Court on October 9 passed on a number of oil suits which were submitted for review during the summer recess, and will consider two cases.

One involves the tax liability in the sale of an oil and gas lease and was presented in the case of Choate v. Commissioner of Internal Revenue. The only issue to be considered is whether, when title to the equipment on a lease passes to an assignee absolutely, the unrecovered cost of the equipment is deductible from the cash consideration in computing gain or must be recovered through the depletion allowance applicable to production from the retained interest in the oil reserve.

Among the cases denied review was that of Coffee v. Shamrock Oil and Gas Corporation, where the petitioner sued to recover additonal royalties on gas used for manufacturing gasoline, butane and propane, contending the existence of a prearrangement between major buyers to suppress the market by paying on "field" or "charcoal" test rather than on the basis of actual recovery.

The second case accepted by the court involved the effort of the Department of Justice, in a complaint against the State of Wyoming and the Ohio Oil Company, to establish the government's title to certain lands in Park County, Wyoming, and recover the value, placed at $165,000, of gas, oil and other petroleum products extracted from the land.

Indian Land Lease Sale

A sale of oil and gas leases on lands owned by the Five Civilized Tribes will be held at Muskogee, Oklahoma, November 14, A. M. Landman, superintendent said. Sealed bids will be received up to 10 a. m. on that date on acreage in Creek, Okfuskee, Hughes, Seminole, Pittsburg, Grady, Pontotoc, Jefferson, Love and Marshall Counties.

PAW Below Budget for First of Fiscal Year

Employment in PAW already has been cut 20 per cent from its peak of July, 1943, and the agency in this fiscal year will turn back to the treasury approximately $700,000 of its $6,000,000 appropriation, it was disclosed October 9. PAW expenditures for the first three months were $1,317,213, or $182,787 under budget.

Deputy Administrator Davies said that as fast as the need for any certain function ceases, the activity is eliminated or, where this cannot be done, the staff is reduced as greatly as possible. This policy has resulted in cutting the staff of the production division from 154 to 106 as a result of reduction of controls such as carried in PAO-11; the construction division has been reduced from 96 to 58 employes as the 100-octane and other building programs near completion, and the marketing and distribution division has been cut from 253 to 154 through the elimination of the asphalt section and the relaxation of regulations, he explained.

At the close of last month, he said, the total staff was 1156 compared with 1438 in July, 1943, the Washington office being cut from 908 to 746 employes and the field staff from 530 to 410.

Navy Department to Sell Products from Elk Hills

The Navy Department will receive bids in San Francisco October 24 for the sale of natural gasoline and liquefied petroleum gas produced for it from the Elk Hills naval reserve from the current time to November 30, 1945.

While the amount of products to be available will depend upon the speed of development work to increase crude production and other factors, the department said approximately 4000 gallons daily of natural gasoline will be available at the Elk Hills gasoline plant in the north half of the northeast quarter of section 3, and an indeterminate amount of natural gasoline and liquefied petroleum gas may also be available at the South Coles levee gasoline plant.

Cut-back in Alcohol for Rubber Use Ordered by WPB

The War Production Board last week ordered a cut-back of 8,000,000 gallons in the October production of alcohol for synthetic rubber reducing the volume required from 30,000,000 to 22,000,000 gallons.

The cut-back is in line with the rubber program which contemplates that beginning with this month production from petroleum will be on the upswing as newly constructed plants come into operation.

Part of the alcohol diverted from rubber will be sent to Russia, which has increased requirements for its own synthetic rubber industry.

Davies Picks Max Ball As Special Assistant

Max W. Ball, nationally known geologist and author of "This Fascinating Oil Business," has been appointed a special assistant to Deputy Administrator Davies and will work on special assignments in all fields of oil operation as they affect government-industry relationships.

Huge Refinery Projects Planned After V-E Day

Defeat of Germany with resulting relaxation of the restrictions on use of materials will be the signal for the United States oil industry to embark on a program of refinery construction at home and abroad expected to cost more than $352,000,000, a survey announced by PAW discloses.

Operators have advised that they plan to spend $176,789,385 in domestic refinery construction and $176,155,000 in foreign construction, not including the rebuilding or rehabilitation of facilities in areas now occupied by the enemy, Deputy Administrator Davies revealed.

Davies urged that WPB give immediate authorization for the proposed refinery construction which includes five new refineries abroad, $146,000,000; and additonal faclities $30,155,000. Domestic projects listed are: Catalytic cracking, $90,775,000; lubes, $42,869,928; greases, $3,524,170; waxes, $2,627,000; crude topping, thermal cracking and coking, $10,612,875; solvents and specialties, $2,075,000; alkylation, isomerization and polymerization, $7,348,000; asphalt, $1,765,000; sulfuric acid, $1,570,000; treating, $500,000; utilites, services, etc., $9,272,412; research and development, $3,850,000.

OPA to Ration Light Naphtha in District 2

Direct rationing of light grades of naphtha has been ordered by OPA for District 2, in an effort to halt use of naphtha as a motor fuel. Authority to undertake rationing was given OPA in an order issued by the War Production Board October 11 after PAW had recommended that control of the solvent be turned over to the price and rationing agency.

Controls will not include those grades used in the manufacture of paints and other products, but will apply only to the lighter grades having an ASTM 10 per cent distillation point lower than 220° F. Date for starting the rationing program is to be announced.

Purchase of naphtha by automobile owners for use with gasoline as a motor fuel is said to be rather widespread in District 2, but not the subject of complaint from other sections.

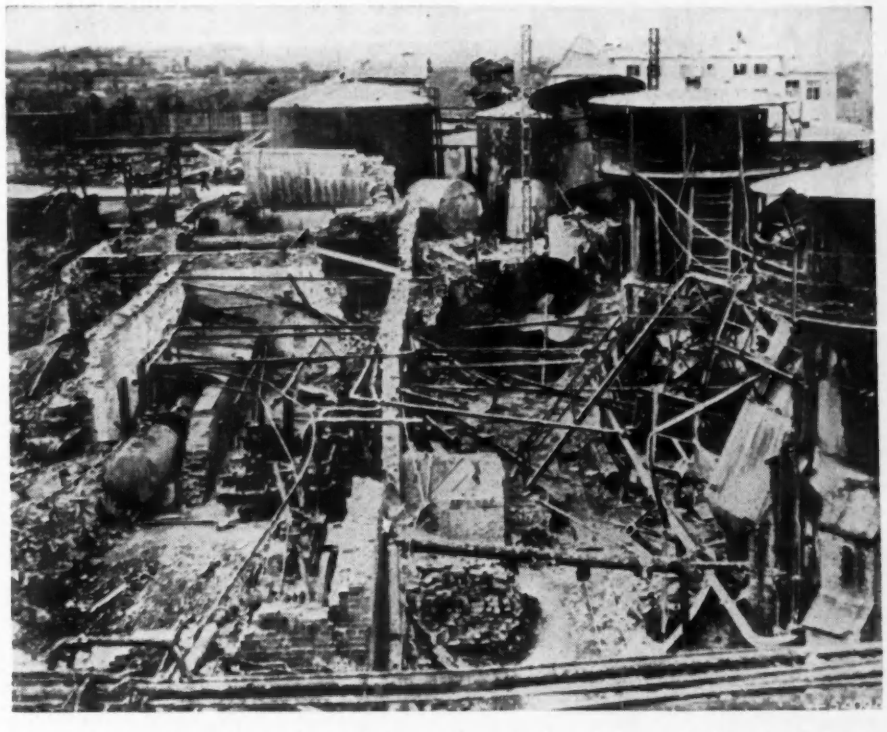
Refining Directors Are Named in Two Districts

Appointment of new directors of refining in two districts was announced by Deputy Administrator Davies October 11.

Carleton J. Everett, domestic product coordinator for Standard Oil Company (New Jersey) in New York prior to joining PAW in June, 1943, as a refining analyst, was named director of refining for Disrict 1, where he has been acting director since the resignation last June of William Naden.

Edward A. Markey, formerly with Continental Oil Company, who joined PAW in June, 1943, as a member of the facility and security staff of District 4 and the following August succeeded Robert N. Sears as assistant director of refining, has been named director of refining for District 4, the first time that position has been filled.

Sample of Refinery Destruction



The shambles presented by the Concordia Vega refinery in Ploesti, Roumania, after the destruction by Allied air attacks during which 13,000 tons of bombs were dropped. The picture is looking down from the central power house stack. (Official U. S. Army photo from International News Photos.)

Changes in Petroleum Export License Procedure

A special license procedure covering MRO materials for the foreign petroleum industry was put into effect by the Foreign Economic Administration October 9, requiring use of form WPB-743 in place of the former Materials Requirements List as a supporting document for SP (Special) license or amendment applications.

The WPB-743 form is to be used for materials required in all operations not covered by form WPB-3649, including (1) All MRO material; (2) all material for use in production, except for special production and natural gasoline production operations, and (3) all other construction operations, including special production and natural gasoline production operations, if the total material cost for any one complete operation is $10,000 or less.

In order to obtain export authorization, the applicant must specifically list on the Materials Requirements List (WPB-743 or WPB-743-C) the following categories of items:

1. Commodites listed in Schedule I, WPB Priorities Regulation No. 9 as amended, and

2. Commodities under total allocation (listing will be made available to holders of SP licenses through PAW).

Other commodities need not be listed in detail but in broad categories with the total dollar value.

Applications for new SP licenses must be submitted to the FEA on form FEA-419 in sextuplicate. In the case of amendments, FEA-419 need not be submitted, as authority to export will be given by the FEA by means of a letter entitled "License-Authority to Export," containing the specific WPB-743 identification, the total dollar value, total weight, and the SP license identification, accompanied by the original copy of the approved WPB-743 or WPB-743-C.

With respect to commodities not listed in WPB Priorities Schedule I or commodities under total allocation, which are not listed in detail, the FEA may require holders of SP licenses to file monthly or other periodic reports of the quantities and types of goods exported within the total dollar limits established for such categories.

Holders of SP licenses should not apply for individual licenses for materials, equipment and supplies relating to approved projects or programs, it was stated. Such individual license applications, if filed, will not be considered and will be returned without action. When placing orders, therefore, holders of SP licenses should instruct their suppliers not to apply for individual export licenses.

Texas Hearing Delayed

Evidence upon which to base November allowables for Texas fields will be heard by the Texas Railroad Commission October 20 in a meeting postponed from October 18.

Application of Phillips Petroleum Company to rearrange proration units in the Yates Field, Pecos County, will be heard October 17.

Threat of Federal Control of Industry Vigorously Denounced at Compact Meet

Resolutions adopted by the Interstate Oil Compact Commission at the conclusion of its Oklahoma City meeting asked the United States Senate to refuse to ratify the Anglo-American oil treaty and urged individual states to strengthen their conservaiton laws and be ready to resume regulation of oil and gas when the war is over.

Virtually the entire meeting was given over to a discussion (THE OIL WEEKLY, October 9) of means to prevent the encroachment of federal agencies into the realm of regulation of oil and gas production within the states. Three phases were considered, the failure of states to provide effective conservation statutes and enforcement, the Anglo-American treaty, and investigations by the Federal Power Commission scheduled to begin soon.

No official action was taken concerning the FPC hearings, although a strong resolution was prepared declaring that this Commission had no jurisdiction over gas production within the various states, and that it should limit its activities to interstate commerce. The FPC has requested state regulatory bodies to supply information concerning reserves, production and distribution of natural gas, and some speakers urged the states to refuse to comply with this request.

Speaking privately, several members of state regulatory bodies attending the Compact meeting indicated they had no intention of giving information to the FPC. Most representatives thought that the probe was the opening wedge the agency planned using to get control of gas production as a competitor for coal; however, they believe that the plan later would be extended to oil production.

George Hill's Address

Several speakers attacked federal encroachment during the two-day session, including Oklahoma's New Deal Governor Bob Kerr. The outstanding speaker was George A. Hill, Jr., of the Houston Oil Company, who charged that the oil problem was merely incidental to the main purpose of the Anglo-American agreement. Its principal purpose, Hill declared, was for it to become the basis for a "superstate." Applying only to oil in the beginning, it would be extended to include all other commodities, and it would eventually give totalitarian powers over industry to the Federal Government, Hill believed.

He pointed out that it was no mere accident that the oil agreement was presented in treaty form. The President, Hill said, was informed well in advance. An opinion presented to him before the treaty was sent to the Senate for ratification pointed out that if the agreement took the form of a treaty, then it would become the law of the land.

"The fact that the President was informed in advance indicates that the administration planned deliberately to obtain control of this commodity through the treaty, then extend it by amendment to other commodities as the opportunity arose," Hill said "with the result an international OPA, supported by federal control, which would govern the production of crude oil, its processing, refining, transportation and marketing, including price fixing throughout the world."

The case Hill presented was carefully documented. He charged that one purpose was to gain from the United States Senate approval and treaty status for the principals of the Atlantic Charter, and that the treaty making device is to be used to substitute the principles of the Atlantic Charter for the United States Constitution.

"There is to be created a new type of international corporation to discharge the functions of government, beyond the present constitutional powers of our Federal Government," Hill declared. "There will be a new type of domestic governmental corporations to be separate and apart from our existing constitutional divisions of government, into legislative, executive and judicial departments, and a fourth department of government created in the domestic field without the limitations imposed upon the legislative, executive and judicial departments."

British Desires

Hiram King, vice president of the Sinclair Prairie Oil Company, said that the program went much further, so far as establishing control, than the British had desired. His investigations in Washington revealed that it was the American governmental delegation that wanted executive authority and power. "The British had one politician and three men from industry, while the American industrial delegation was not permitted to sit in throughout the session," he reminded.

If the treaty is approved by the Senate, then a Commission will run all oil properties in the country. Senator Pepper of Florida is urging the treaty, and is supporting a plan to require only a majority of the Senate for its approval, rather than two-thirds of the membership as is required now."

Joseph Pogue, vice president of the Chase National Bank, digressed from his prepared paper, (THE OIL WEEKLY, October 9) discussed the treaty generally, and concluded that it would be unsatisfactory in its present form. He declared that a group with whom he is associated has for the past two years been urging that the government develop a foreign oil policy, and said that a paper had been prepared on the subject after long deliberations with various experts.

Pogue said that government should rely on industry to guide the solution to the development of this policy.

Foes of Oil Agreement Establish Headquarters

Headquarters of the committee to oppose Senate ratification of the Anglo-American Petroleum agreement, have been established at the Stephen F. Austin Hotel, Austin.

Grady Vaughn is chairman and Glenn McCarthy co-chairman of the committee appointed by Beauford Jester, chairman of the Texas Railroad Commission, to carry out the mandate of a resolution passed by operators in Austin, September 19. This resolution enumerated objections to the agreement and recommended that the Senate not give its advice and consent to the ratification.

Since then, the resolution, in identical terms, has been adopted by independent oil producers in Railroad Commission District 3, the American Association of Oil Well Drilling Contractors, the Interstate Oil Compact Commission, and is being considered by various other groups in the industry.

Part of the announcement released from the state committee headquarters in Austin follows: "It seems to us that it is urgent and important that the citizens of Texas and of America, and all organizations concerned with the welfare of our Country should take at once a definite, courageous and positive stand on this matter." A suggested procedure for operators to follow includes presentation of the problem in local communities, securing cooperation of newspapers, advising senators of the action being taken and cooperation with committee headquarters.

Navy Needs Officers

The Navy still needs officers qualified for petroleum inspectors or oil terminal supervisors. The age bracket for petroleum inspectors is 23 to 45 and for oil terminal supervisors, 30 to 50. Candidates must meet basic Naval physical requirements. Full information can be secured at the nearest office of Naval Officer Procurement, located in principal cities.

Crude Oil Production in the United States

(Estimates compiled by The OIL WEEKLY. All figures indicate daily averages, in barrels.)

STATE OR DISTRICT	PRODUCTION IN WEEK ENDED October 14	October 7
Alabama	300	300
Arkansas	80,600	80,800
California	887,500	895,000
Colorado	9,050	8,650
Florida	50	50
Illinois	204,700	194,800
Indiana	13,200	13,550
Kansas	267,900	251,300
Kentucky	24,650	28,750
Louisiana	363,800	362,750
North Louisiana	74,050	73,000
South Louisiana	289,750	289,750
Michigan	51,900	49,350
Mississippi	45,800	49,250
Missouri	100	100
Montana	20,970	25,550
Nebraska	900	950
New Mexico	103,550	104,750
New York	14,300	13,500
Ohio	7,750	8,000
Oklahoma	345,200	344,000
Pennsylvania	38,900	39,900
Tennessee	35	35
Texas	2,133,350	2,133,350
Upper Gulf Coast	537,700	537,750
East Texas Field	371,350	371,400
Rest of Eastern Texas	149,500	149,500
Lower Gulf Coast	236,850	236,800
Southwest Texas	77,800	77,750
South Central Texas	19,750	19,700
West Texas	492,800	492,800
North Texas	148,800	148,850
Panhandle	98,800	98,800
West Virginia	8,700	8,450
Wyoming	96,900	100,300
Total United States	4,720,105	4,713,435

Return to State Control and Avoidance Of Federal Regulation Urged by IPAA

The Independent Petroleum Association of America will try to defeat the present Anglo-American oil treaty, will continue to fight for higher crude oil prices, will actively oppose federal regulation of both oil and gas, and will seek to promulgate return to state regulation.

These were the principal decisions made at the association's annual directors meeting, held in Dallas on October 9-10-11, with nearly half of its 400 directors present. In addition to the above program, the following were included in the association's platform for the coming year:

1) To maintain its opposition to the importation of foreign oil;

2) To urge further relinquishment of PAW wartime drilling and spacing restrictions in all states having adequate statutory legislation;

3) To seek legislation requiring disposition by federal agencies of mineral rights under all lands except public domains;

4) To recommend simplification of national tax structures and to eliminate discriminatory features with respect to taxes on corporations; and

5) To continue its study of cooperative organizations in the petroleum field.

Open Forum Meeting

The meeting was an outstanding example of the American system of open forum discussion, with every one given an opportunity to discuss any phase of the complicated problems confronting the industry. There were many pro and con arguments, sometimes rather heated debate, but in the end the assembly worked down to a unified stand on each question. The first day and a half were devoted to the open forum with the chairman, President Ralph Zook, introducing topics for discussion. The discussions constituted suggestions to the association's committees, which drafted resolutions in keeping with sentiment expressed. Another opportunity for discussion came when the resolutions were presented at the final session for adoption.

Unanimous Treaty Opposition

The position of the association vigorously opposing the Anglo-American oil agreement was ageed upon quickly, with no one defending it. The agreement was characterized as a "scheme to amend the Constitution of the United States by a treaty," and as just another move of the "federal government to obtain control of the oil industry."

In presenting a resolution from the floor, George A. Hill, Jr., charged that although the discussions started with the purpose of working out an agreement that it had become a treaty, because President Roosevelt has submitted it to the Senate for ratification. "As a treaty," he warned, "it will become the supreme law of the land, not withstanding the Constitution. This was no accidential submittance, but a move planned with malicous forethought." Hill pointed out that the measure certainly meant federal control of the oil industry, but that its importance was far broader in scope. "Since the agreement was drafted to carry out the provisions of the Atlantic Charter," he continued, "not only oil but all other forms of commodity will be subjected to the same treatment. Do you want international control of all business? Do you want an international OPA?"

"The agreement should not be approved as written," asserted Zook. The postwar oil situation will be such that this country will be threatened with the loss of its export market and be subjected to pressure to receive as imports much foreign oil. For this reason it is important to the independent producer that an effort be made to develop and transportation of natural gas, but also its use. No oil is produced without some gas also being produced, so this would give the government control of oil as well as gas. It will say whether you should use coal or gas as fuel."

Several speakers charged that all the information desired by FPC was already available through PAW or the Bureau of Mines, and that there was no need for the investigation.

The resolution adopted by IPAA declared that the regulation of production and conservation of natural gas is the recognized constitutional right of the state and that the powers of the FPC under the natural gas act does not extend or apply to the production or gathering of natural gas. The resolution asserted that national interference and dislocation of this power and function can be destructive to the American system of government, and

All the men to serve the Independent Petroleum Association of America as president were present at the directors' meeting held in Dallas last week. From left to right are: Wirt Franklin, Ardmore, Oklahoma, who served from 1929-1935; Charles F. Roeser, Fort Worth, 1936-1939; Frank Buttram, Oklahoma City, 1940-1943; and Ralph T. Zook, Bradford, who served in 1944 and was reelected for 1945.

Zook was reelected as were Harold B. Fell of Ardmore, Oklahoma, executive vice president since 1933, Russell B. Brown of Washington, general counsel, C. E. Buchner of Tulsa, secretary and executive manager, and N. T. Gilbert of Tulsa, treasurer.

Merle Becker of St. Louis, Missouri, A. E. Hermann of Amarillo, Texas, and J. L. Hamon of Dallas, were elected to the executive committee.

Five new men were chosen vice presidents for their respective states, J. D. Sanford of Mount Vernon, Illinois, J. C. Miller, Owensboro, Kentucky, C. W. Treater, Saginaw, Michigan, W. M. Vaughey, Jackson, Mississippi, and Eugene Jordan, Oklahoma City.

some vehicle. No one wishes to see conditions in world markets that will destroy the American oil industry. But the present treaty is so faulty that I say it is a case of take it or leave it, then I say let's leave it."

After adoption of a strong resolution opposing the agreement, the meeting heard Beauford Jester, chairman of the Texas Railroad Commission, say the agreement is dangerous not only to oil but destructive to the nation's social and industrial structure. He promised the Railroad Commission would join the fight against the agreement.

Object to Gas Investigation

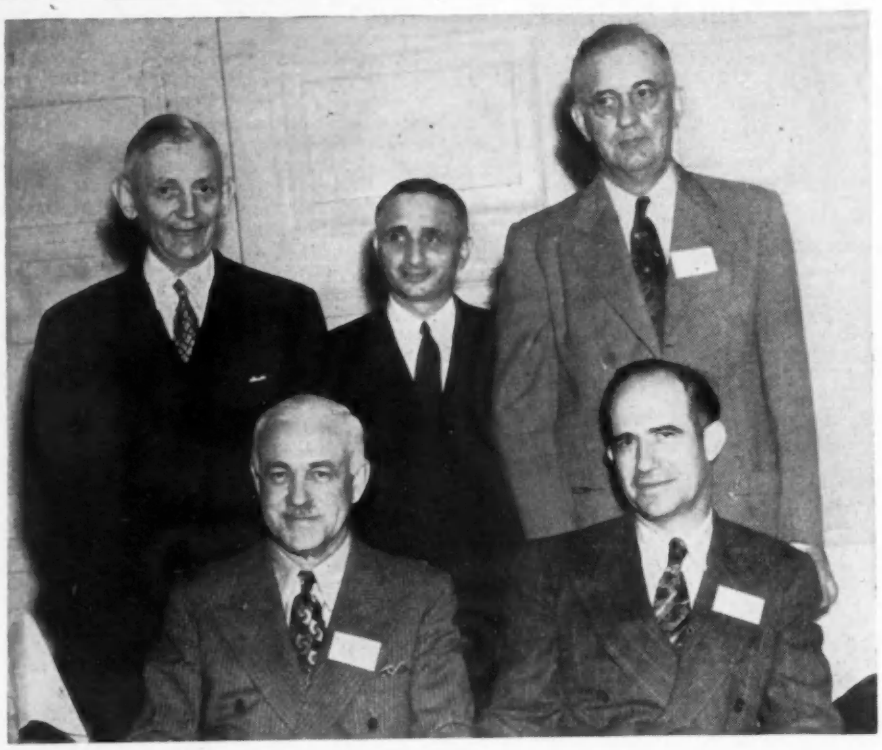
The pending investigation of the natural gas industry by the Federal Power Commission was roundly denounced. "The purpose of this investigation," declared George Hill, "is to make recommendations for legislation that would control not only the production that plan to control the use of gas is contrary to the longstanding public policy of free competition and free interstate commerce.

"We are going to strengthen Texas gas conservation laws," Beauford Jester announced. "We plan the introduction of measures at the state legislature beginning in January that will conserve our natural gas resources. This will be done not only to perpetuate conservation, but to ward off any excuse for federal control."

In addition to the resolution on the FPC, several other resolutions regarding federal control of oil, including some touching on wartime regulation of driling, were adopted.

In general, these resolutions and expressions from the floor asserted that conservation of oil is the invested right of the states, could best be accomplished by free enterprise under state

Stripper Well Association Officers



Officers of National Stripper Well Association named last week in Dallas are shown above left to right, front row: Howard J. Whitehill, of Tulsa, newly elected president; and J. D. Sandefer, retiring president. Back row: Harold B. Fell, Ardmore, reelected vice president; N. W. Shiarella, Owensboro, Kentucky, newly elected vice president; and Fred Schmann, Wichita Falls, secretary-treasurer.

regulation, and urged that state conservation laws be improved to provide adequate machinery so there would be excuse for federal control.

One resolution expressed the sentiment that postwar reconversion of the oil industry could best be handled by established state regulatory bodies. "The relinquishment of the war emergency authority in all matters of crude petroleum and natural gas regulation properly belonging to the states," it read, "is an essential to the resumption of the orderly and well established practices of the crude petroleum and natural gas producing industries when the necessity for war emergency controls shall have passed." This resolution went on to urge "all public officials having wartime authority or discretion in the development and producition of crude petroleum and natural gas resources to relinquish such authority promptly and without reservation at the earliest possible moment consistent with the national security and the prosecution of the war."

The same resolution asked "that we urge the Congress to use its authority to restore the constitutional control of the states over the development and production of these natural resources and that we further urge all governors of crude petroleum and natural gas producing states and all regulatory officials thereof and the Interstate Oil Compact Commission to use their efforts in furtherance of the foregoing objectives."

Another resolution urged "further relinquishment of the wartime regulations in all states having adequate stadrilling of wells." It also recommended tionary authority over the spacing and that in "other states where statutory authority does not exist that the administration of the wartime regulations be further decentralized and administered through local divisions of PAW.

Another resolution asked the Interstate Oil Compact Commission to "do everything within its power to return the regulation of the oil industry to the state regulatory bodies," and that "every possible effort be made to bring into the Interstate Oil Compact those states now producing oil, that are not now members."

The War Production Board, in another resolution, was "urged to allocate the amount of steel it can spare to the oil industry" so that drilling repair parts might be manufactured and "placed in stock with oil well supply companies in one or more places in each state. . . . We think this would greatly reduce the expensive shutdowns due to having the different repairs made after the order has been placed, and would not take any more steel." This same resolution asks the PAW to continue "to allow the use of butane fuel for use in drilling engines, especially on wildcat wells; otherwise, due to the scarcity of fuel oil, trucks and tires to transport it with, it would almost shutdown wildcat drilling and retard it to a great extent in proven fields."

Congress should enact legislation "to provide for the disposition of all mineral rights now held by the federal government except under lands in the public domain," another resolution states.

Declaring that PAW was necessary in time of war, Jester warned that it would be difficult to get back regulation of oil to the states.

"Signs are crystal clear that an effort will be made to retain regulation of oil and gas after the war is over," he said. "The Petroleum Reserves Corporation, the Arabian Pipe Line, the Anglo-American agreement, and the Federal Power Commission investigation, constitute too many indications that the federal government desires to continue its control." He urged that everyone inform Congress of the need to return to state regulation.

Will Continue Price Fight

The position of the association that there should be an overall increase in the price of crude oil with compensatory product prices was reaffirmed at the meeting. There was unanimous agreement that crude prices should be advanced, but there was much difference of opinion as to whether the independent producer should make a case for himself alone or to continue to carry the refiner along. This phase caused more discussion than any other subject, and was repeatedly opened. The vote was close.

Those favoring an association plea based strictly upon the position of the independent producer asserted that refiners had received advanced prices just before the price freeze and were able to absorb all or most of a 35-cent per barrel increase, that there was no chance of getting a raise if it involved higher refinery prices which would be passed on to the public, and that the producer should state his case and let the refiner then present his case for compensatory prices.

Those opposing this action, but favoring the continuation of the previous position of the association, declared there would be a loss of face if a change was made, that the producer should not be selfish but for a sound overall industry, that the two phases could not be segregated because one was dependent on the other, and that the federal government would want nothing better than to see the industry beset by internal strife.

Conferences of Oil Men Scheduled During Week

A series of conferences with Texas, Louisiana, and Arkansas oil men is planned during this week with sessions to be held at the Driscoll Hotel in Corpus Christi, Monday noon, October 16; Rice Hotel, Houston, Wednesday noon, October 18; Willow Brook Country Club, Tyler, Thursday noon, October 19, and Caddo Hotel, Shreveport, Friday noon, October 20.

Attending the conferences will be Ralph T. Zook, president of the Independent Petroleum Association of America, and Russell B. Brown, IPAA general counsel. Each will give short talks on important problems confronting independent oil producers followed by general discussion of the problems and the Association's program.

☆

JOHN J. McCREA, manager of the industrial relations department for Stanolind Oil & Gas Company in the Fort Worth division, has been transferred to Tulsa as superintendent of the Oklahoma district. He was succeeded at Fort Worth by R. A. Johnson.

How to Increase the Life of Oil Field Equipment

Ball and seat valve of "K" Monel. At depth of 3500 feet . . . pulsating 28,000 times a day . . . subjected to action of corrosive crude . . . this heat-treated valve stood up 10 months, 22 days. Alloy steel valve in the same well lasted only 21 days.

Photo courtesy Jon R. Long Mfr., Fort Worth, Texas

. . . by using "K" Monel

The petroleum industry knows many uses for strong, corrosion-resistant nickel alloys...from wire rope to gaskets...from nuts and bolts to sucker rods.

For oil field equipment that must have *extra* strength to withstand stress, vibration and wear... severe corrosion by brine and sour crude...abrasion by entrained solids..."K" Monel is the alloy to use.

This non-magnetic high-nickel alloy possesses excellent physical properties. By heat treatment its tensile strength is developed to 145,000—170,000 psi., and its hardness to 25—35 Rockwell "C". Prior to heat treatment, it can be readily formed, machined and welded.

This valuable combination of properties makes "K" Monel ideal for equipment of the type listed below...for equipment that will insure continuous, reliable operation under conditions that rapidly weaken and destroy most metals.

"K" MONEL IMPROVES PERFORMANCE OF

Gas Lift Valve Parts	Electrical Logging Winch Drums
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Non-Magnetic Subs	Pump Shafts
Ball and Seat Valves	Pressure Gauges
Drop and Seat Valves	Working Barrels
Instrument Parts	Sucker Rods
Bottom Hole Chokes	

Write for detailed information about "K" Monel in any contemplated use. At the same time request your copy of Bulletin T-9 "Engineering Properties of 'K' Monel."

"K" Monel is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper, with a small aluminum content that permits hardening by heat treatment.

INCO MONEL

Arkansas' Gas Condensate Law

Sound in theory, practical in operation, this statute has much to offer in conservation, careful study reveals

By GEORGE O. IVES, Staff Writer

WHEN oil and gas men discuss gas conservation, or natural gas and distillate well conservation legislation the Arkansas conservation bill invariably is brought into the conversation.

Probably it would be possible to devise a statute which would be even more sound from the standpoint of the oil/gas industry and the public, but the Arkansas bill appears to be the most constructive proposition to be enacted into law to date.

Because of the growing sentiment that other states had best look to their gas and condensate well conservation legislation, or the federal government will do it for them, *The Oil Weekly* has been making a study of the Arkansas law, checking with operators and officials of that state to determine just how it works and why it is regarded as sound.

In the following discussion, frequent reference will be found to Texas statutes. This is because the Texas law has inadequacies which we believe should be called to attention, and further because the laws in some other Southwestern states have been patterned in part after portions of the Texas laws.

In studying the Arkansas law, *The Oil Weekly* addressed letters to the principal operators there, asking their opinion as to how the law is working. It asked a similar question of the Arkansas Oil and Gas Commission. Replies were received to most of the letters and without exception, all said that the law was sound. Much of the material in the following discussion was taken from these letters. Thus, without mentioning the names of our correspondents, we are quoting, in some instances verbatim, from the opinions of practical men operating under the law in question.—*The Editor.*

THE Arkansas General Assembly, in preparation for its Act 105 of 1939, the oil and gas conservation law, took into account many of the problems encountered through the growing importance of gas-condensate fields as sources of petroleum supply. The laws of some other states have "jes' growed," like Topsy.

The legislature profited by the mistakes and experiences of itself and others, and delegated broad powers to its Oil and Gas Commission, calculated to serve the interests of conservation. It went still further in acting to protect the vested co-equal or correlative rights of all owners of crude oil and natural gas in common sources of oil or gas.

Throughout the act provisions have been made which are obviously in the interests of true conservation, and the Commission is charged with the protection of correlative rights of each owner of oil or gas in a common reservoir due to non-uniform, disproportionate, and unratable withdrawals causing undue drainage between tracts of land, by the inclusion of such abuse of correlative rights in the definition of waste.

Production Plan

Drilling units are set by the Commission after study of reservoir conditions, and no more wells are allowed than those actually required to drain the reservoir. Allowed production is not predicated upon market demand or transportation limitations, but upon the actual ability of the pool or field to produce. This feature has been exceptionally successful in that each pool is limited to its optimum rate of production, whether it be gas or oil. At the same time the act provides that each producer must have the opportunity to produce his just and equitable share of the reserves of each pool. Therefore under the law, no per-well allowables are granted. Allocation must be based on the actual proportion of the reserves underlying each tract, taking into account acreage, bottom-hole pressures, sand thickness, or a combination of these factors. The well itself is simply the means of proving the proration unit productive.

In addition to the important feature of making the same law applicable to both oil and gas, a number of other provisions have been incorporated which are definite forward steps in the regulation and conservation of oil and gas. Specific authority has been given the Commission to act in the interest of correlative rights as well as conservation. Perhaps the most important are:

(1) Authority to force pooling.

(2) Authorization of voluntary unit operation, with assurance that such agreement between owners and the Commission shall not be construed as a violation of anti-trust laws.

(3) Authority to regulate secondary recovery operations, including pressure maintenance, recycling, cycling, repressuring, waterflooding, etc.

(4) Authority to set up drilling units and proration units as synonymous, the drilling unit covering the maximum area which may be economically drained by one well.

May Require Pooling

The pooling of two or more separately owned tracts of land within an established drilling unit may validly be accomplished by agreement between the owners. This has been provided for in other statutes, in other states, but Section 15 (A) of the Arkansas law states that the Commission may **require** such pooling for the prevention of waste and to avoid drilling of unnecessary wells. Such orders are issued only upon failure of the owners to integrate their holdings voluntarily, after hearings, and upon terms and conditions which will allow each owner to recover his portion of the oil and gas in the pool without unnecessary expense.

The Texas statutes, for instance, permit cooperative development within a proven natural gas field upon approval by the attorney general, but such agreement binds only those involved and does not include oil fields. Furthermore the Texas Commission has no authority to require pooling as between operators where the operators cannot reach agreement on a voluntary plan. The Arkansas law provides further, as added incentive to pooling, that when owners of separate tracts within a drilling unit fail to agree upon integration, and the Commission is without authority to require integration under Section 15 (A), then, subject to other applicable provisions under the act, the operator of each tract may drill a well, but the allowable production from each tract will be only in such proportion to the allowable for an entire unit as the size of each tract bears to the size of the full drilling unit.

Pooling of interests to form drilling units is not in itself sufficient in most gas-condensate pools. For efficient operation the entire field, or the major portion of it, should be brought under control so the field as a whole may be operated as a unit. Engineers are almost uniform in their approval of such operational practices from a conservation standpoint, but most operators in other states fear that in making such agreements they will run afoul of anti-trust statutes. The Arkansas statute, in Section 15 (C) gives necessary legislation for voluntary unit operation, by providing that such agreements when made within the interests of conservation and upon approval by the Commission "... shall not be held or construed to violate any of the statutes of this state relating to trusts, monopolies, or contracts and combinations in restraint of trade."

On the other hand the Texas statutes (Article 6014g) provide: "However, it is not the intention of this act to require repressuring of an oil pool or that the separately-owned properties in any pool be unitized under one management, control, or ownership."

Secondary Recovery Research

In Act 302 of 1943 the Arkansas State Assembly recognized the importance of secondary recovery operations of all types, and authorized a fund for conducting research and collecting data on all fields with a long-range view to possible institution of secondary recovery operations where and when necessary. The Commission was instructed to report to the next regular session of the legislature its recommendations as to whether further legislation is necessary

in any particular pool or pools in Arkansas. At the same time it provided protection from anti-trust laws for any persons owning and operating oil fields who, with approval of the Commission, shall agree among themselves for the employment of any secondary recovery methods for the production of oil and prevention of waste.

Before designating drilling and proration units in pools or fields, the Commission is empowered to hold hearings at which evidence is gathered regarding all pertinent reservoir conditions which have a bearing on deciding upon the size unit which can be effectively drained by one well. However, the Commission has no authority under Act 105 to fix a drilling unit as a basis for development of an oil pool at an area in excess of 40 acres, allowing a 10-acre tolerance for the purpose of completing development and allocating production. Such units constitute a developed unit as long as there is a well located thereon which is capable of producing oil or gas in paying quantities.

In setting a limit on the size of drilling units, it has been noted that while oil is limited to 50-acre units, maximum, there was no limit set on gas development. A number of the principal producing areas in Arkansas are gas-condensate pools, and no trouble has been experienced from a proration standpoint. Usually 160-acre units are prescribed, and proration is based on acreage alone. However, units may be smaller if reservoir conditions warrant. Smaller units would have smaller allowables in proportion to the acreage they contain. Allowables are controlled by changes in reservoir pressure and based upon cubic feet of gas. Production of distillate is regarded as incident to the production of allowed gas. Gas proration in Texas is difficult since the total permitted withdrawal from the field is placed arbitarily at 25 per cent of the open flow potential, and no provision is made in the statutes for allocating the withdrawal in an equitable manner from the various individual wells located in the pool to prevent drainage between tracts or to prevent one operator from recovering more of the gas than was originally in place under his land.

"Fair Law, Skillfully Enforced"

Section 9 of Arkansas Act 105 defines "oil" as crude petroleum oil, and any other hydrocarbons, regardless of gravity, which are produced at the well in liquid form by ordinary production methods, and which are not the result of condensation of gas after it leaves the reservoir. "Gas" may mean all natural gas, including casinghead gas and other hydrocarbons not defined as oil in the preceding subsection.

Oil operators interviewed regarding the adequacy of the Arkansas conservation law have been unstinting in their praise for the fair, impartial, and skillful manner in which it has been enforced. The regulatory body, called the "Oil and Gas Commission" is a non-political body, appointed by the Governor and consisting of seven members. They receive no pay other than $10 per day while attending meetings or hearings in addition to traveling expenses. Terms of office range from two to six years and unexpired terms are filled by appointment of the governor. They must be residents and citizens of Arkansas and a majority must be experienced in development, production and transportation of oil and gas.

Through its policy of setting allowables at rates which will insure the greatest possible ultimate recovery, the Commission does not grant allowables which wells are unable to make. All pools are watched carefully and tests are made periodically by representatives of the Commission to determine bottom-hole pressures, water encroachment, and other important data. Thus the Commission is in possession of as much information as the operators themselves and consequently is in a position to promulgate the necessary rules and regulations so that each pool will be operated and produced in a proper manner. More important than this, however, is the simple fact that the Arkansas State Assembly, the legislative body, has been clear-sighted enough to delegate to the Commission the clearly defined authority which it must have to properly carry out its functions.

Excerpts from Bill

Important sections of the Arkansas oil and gas conservation law (Act 105 which became effective February 20, 1939, except Section 14B adopted later and effective June 11, 1941) are reproduced below:

Section 1. Declaration of Policy. In recognition of past, present, and imminent evils occurring in the production and use of oil and gas, as a result of waste in the production and use thereof in the absence of coequal or correlative rights of owners of crude oil or natural gas in a common source of supply to produce and use the same, this law is enacted for the protection of public and private interests against such evils by prohibiting waste and compelling ratable production.

Section 2. There is hereby created the "Oil and Gas Commission," hereinafter in this Act called the "Commission," to be appointed by the Governor immediately after this Act takes effect for terms of the following duration: Two members for a term of two years, two members for a term of four years, and three members for a term of six years; provided that at the expiration of the term for which each of these appointments is made, each successor member shall be appointed for a term of six years, and in the event of a vacancy, the Governor shall by appointment fill such unexpired term. All of the members of said Commission shall be residents and citizens of the State of Arkansas, at least thirty years of age, a majority of whom shall be experienced in the development, production and transportation of oil and gas. Each member shall qualify by taking an oath of office, and shall hold office until his successor is appointed and qualified. The Commission shall elect from its number a Chairman. The Commission shall establish an office at the County seat of some county in Arkansas in which oil or gas is produced, which place shall be designated by resolution of the Commission, and at which the records of the Commission shall be kept. The Commission shall meet or hold hearings at such times and places as may be found by the Commission to be necessary to carry out its duties, and each member shall receive as compensation for his services the sum of $10 for each day he attends a meeting or hearing, and in addition thereto, all necessary traveling expenses.

Section 9. Unless the context otherwise requires, the words defined in this section shall have the following meaning when found in this Act:

C. "Oil" shall mean crude petroleum oil, and other hydro-carbons, regardless of gravity, which are produced at the well in liquid form by ordinary production methods, and which are not the result of condensation of gas after it leaves the reservoir.

D. "Gas" shall mean all natural gas, including casinghead gas, and all other hydrocarbons not defined as oil in subsection C above.

E. "Pool" shall mean an underground reservoir containing a common accumulation of crude petroleum oil or natural gas or both. Each zone of a general structure which is completely separated from any other zone in the structure is covered by the term 'pool" as used herein.

F. "Field" shall mean the general area which is underlaid or appears to be underlaid by at least one pool; and "field" shall include the underground reservoir or reservoirs containing crude petroleum oil or natural gas, or both. The word "field" and "pool" mean the same thing when only one underground reservoir is involved; however, "field," unlike "pool," may relate to two or more pools.

I. "Waste" in addition to its ordinary meaning, shall mean "physical waste" as that term is generally understood in the oil and gas industry. It shall include:

(3) Abuse of the correlative rights and opportunities of each owner of oil and gas in a common reservoir due to non-uniform, disproportionate, and unratable withdrawals causing undue drainage between tracts of land.

(11) Permitting gas produced from a gas well to escape into the air.

Section 10. Waste of oil or gas as defined in this Act is hereby prohibited.

Section 11. The Commission shall have authority to make . . . rules, regulations or orders for the following purposes:

I. To regulate secondary recovery methods, including the introduction of gas, air, water, or other substance into producing formations.

J. To limit and prorate the production of oil or gas or both, from any pool or field for the prevention of waste as herein defined.

L. To regulate the spacing of wells and to establish drilling units.

M. To prevent, so far as is practical, reasonably avoidable drainage from each developed unit which is not equalized by counter-drainage.

Emergency Rules

Section 12—

C. In the event an emergency is found to exist by the Commission which in its judgment requires the making, changing, renewal or extension of a rule, regulation or order without first having a hearing, such emergency rule, regulation or order shall have the same validity as if a hearing with respect to the same had been held after due notice. The emergency rule, regulation or order permitted by this section shall remain in force no longer than ten days from its effective date, and, in any event, it shall expire when the rule, regulation or order made after due notice and hearing with respect to the subject matter

ot such emergency rule, regulation or order becomes effective.

Section 14. A. Whether or not the total production from a pool be limited or prorated, no rule, regulation or order of the Commission shall be such in terms or effect (1) that it shall be necessary at any time for the producer from, or the owner of, a tract of land in the pool, in order that he may obtain such tract's just and equitable share of the production of such pool, as such share is set forth in this section, to drill and operate any well or wells on such tract in addition to such well or wells as can without waste produce such share, or (2) as to occasion net drainage from a tract unless there be drilled and operated upon such tract a well or wells in addition to such well or wells thereon as can without waste produce such tract's just and equitable share, as set forth in this section, of the production of such pool.

B. For the prevention of waste and to avoid the augmenting and accumulation of risks arising from the drilling of an excessive number of wells, the Commission shall, after a hearing establish a drilling unit or units for each pool, except in those pools which, prior to the effective date of this Act, have been developed to an extent and where conditions are such that it would be impracticable or unreasonable to use a drilling unit at the present stage of development. A driling unit, as contemplated herein, means the maximum area which may be efficiently and economically drained by one well, and such unit shall constitute a developed unit as long as a well is located thereon which is capable of producing oil or gas in paying quantities.

Drilling Unit Restrictions

It is provided, however, that the Commission shall have no authority to fix a drilling unit as a basis for the development or operation of any oil pool in excess of 40 acres; except where a well has been or shall be drilled on a lease covering more than 40 acres, owned by one person, or by persons in moiety, the acreage in excess of 40 acres, but in no event more than 10 acres in excess of 40 acres, upon which such a well is drilled, may be used for the purpose of allocating production, where the Commission finds that such an order is reasonably necessary to prevent the drilling of unnecessary wells, and to insure that the owners of such tract covered by said lease may obtain such tract's just and equitable share of the production of said pool.

D. Subject to the reasonable requirements for prevention of waste, a producer's just and equitable share of the oil and gas in the pool (also sometimes referred to as a tract's just and equitable share) is that part of the authorized production for the pool (whether it be the total which could be produced without any restriction on the amount of production, or whether it be an amount less than that which the pool could produce if no restriction on amount were imposed) which is substantially in the proportion that the quantity of recoverable oil and gas in the developed area of his tract in the pool bears to the recoverable oil and gas in the total developed area of the pool, in so far as these amounts can be practically ascertained; and to that end, the rules, regulations, permits and orders of the Commission shall be such as will prevent or minimize reasonably avoidable net drainage from each developed unit (that is, drainage which is not equalized by counter drainage), and will give to each producer the opportunity to use his just and equitable share of the reservoir energy.

Section 15—

A. When two ore more separately owned tracts of land are embraced within an established drilling unit, the owners thereof may validly agree to integrate their interests and to develop their lands as a drilling unit. Where, however, such owners have not agreed to integrate their interests, the Commission shall, for the prevention of waste or to avoid the drilling of unnecessary wells, require such owners to do so and to develop their lands as a drilling unit. All orders requiring such integration shall be made after notice and hearing, and shall be upon terms and conditions that are just and reasonable, and will afford to the owner of each tract the opportunity to recover or receive his just and equitable share of the oil and gas in the pool without unnecessary expense, and will prevent or minimize reasonably avoidable drainage from each developed unit which is not equalized by counter drainage. The portion of the production allocated to the owner of each tract included in a drilling unit formed by an integration order shall, when produced, be considered as if it had been produced from such tract by a well drilled thereon.

B. Should the owners of separate tracts embraced within a drilling unit fail to agree upon the integration of the tracts and the drilling of a well on the unit, and should it be established that the Commission is without authority to require integration as provided for in subdivision A of this section, then, subject to all other applicable provisions of this Act, the owner of each tract embraced within the drilling unit may drill on his tract but the allowable production from such tract shall be such proportion of the allowable for the full drilling unit as the area of such separately owned tract bears to the full drilling unit.

Cooperative Arrangement

C. Agreements made in the interest of conservation of oil or gas or both, or for the prevention of waste, between and among owners or operators, or both, owning separate holdings in the same oil or gas pool, or in any area that appears from geological or other data to be underlaid by a common accumulation of oil or gas, or both, or between and among such owners or operators, or both, and royalty owners therein, of the pool or area, or any part thereof, as a unit for establishing and carrying out a plan for the cooperative development and operation thereof, when such agreements are approved by the Commission, are hereby authorized and shall not be held or construed to violate any of the statutes of this state relating to trusts, monopolies, or contracts and combinations in restraint of trade.

Section 16—

B. Whenever the Commission limits the total amount of oil or gas which may be produced in any pool in this state to an amount less than that amount which the pool could produce if no restriction were imposed (which limitation may be imposed either incidentally to, or without, a limitation of the total amount of oil or gas which may be produced in the state), the Commission shall prorate or distribute the allowable production among the producers in the pool on a reasonable basis so as to prevent or minimize reasonably avoidable drainage from each developed unit which is not equalized by counter drainage, and so that each producer will have the opportunity to produce or receive his just and equitable share, as above set forth, subject to the reasonable requirements for the prevention of waste.

Section 26. In order to protect further the natural gas fields and oil fields in this state, it is hereby declared to be unlawful for any person to permit negligently any gas or oil well to go wild or to get out of control. The owner of any such well shall, after twenty-four (24) hours' written notice by the Commission given to him or to the person in posession of such well, make reasonable effort to control such well.

In the event of the failure of the owner of such well within twenty-four (24) hours after service of the notice above provided for, to control the same, if such can be done within the period, or to begin in good faith upon service of such notice, operations to control such well, or upon failure to prosecute diligently such operations, then the Commission shall have the right to take charge of the work of controlling such well, and it shall have the right to proceed, through its own agents or by contract with a responsible contractor, to control the well or otherwise to prevent the escape or loss of gas or oil from such well all at the reasonable expense of the owner of the well. In order to secure to the Commission in the payment of the reasonable cost and expense of controlling or plugging such well, the Commission shall retain the possession of the same and shall be entitled to receive and retain the rents, revenues and incomes therefrom until the costs and expense incurred by the Commission shall be repaid. When all such costs and expenses have been repaid, the Commission shall restore possession of such well to the owner; provided, that in the event the income received by the Commission shall not be sufficient to reimburse the Commission as provided for in this section. The Commission shall have a lien or privilege upon all of the property of the owner of such well, except such as is exempt by law, and the Commission shall proceed to enforce such lien or privilege by suit brought in any court of competent jurisdiction, the same as any other like civil action, and the judgment so obtained shall be executed in the same manner now provided by law for execution of judgments. Any excess over the amount due the Commission which the property seized and sold may bring, after payment of court costs shall be paid over to the owner of such well.

Secondary Recovery
Act 302 of 1943

"An Act defining secondary recovery methods in oil or gas condensate fields; providing for an investigation of secondary recovery possibilities and the printing of the findings; providing protection from state and federal anti-trust acts; providing a sum of $5,000.00 from the conservation fund of the Treasury De

■ CONTINUED ON PAGE 6

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2 ✓

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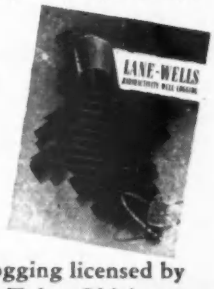

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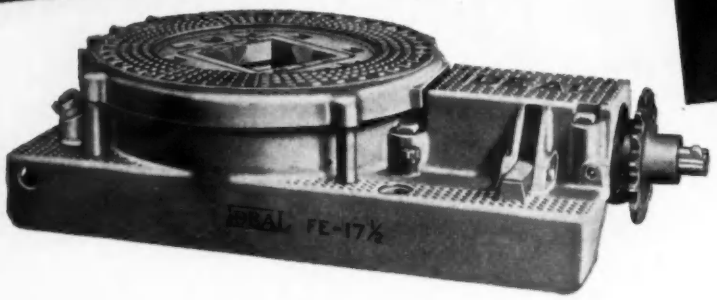
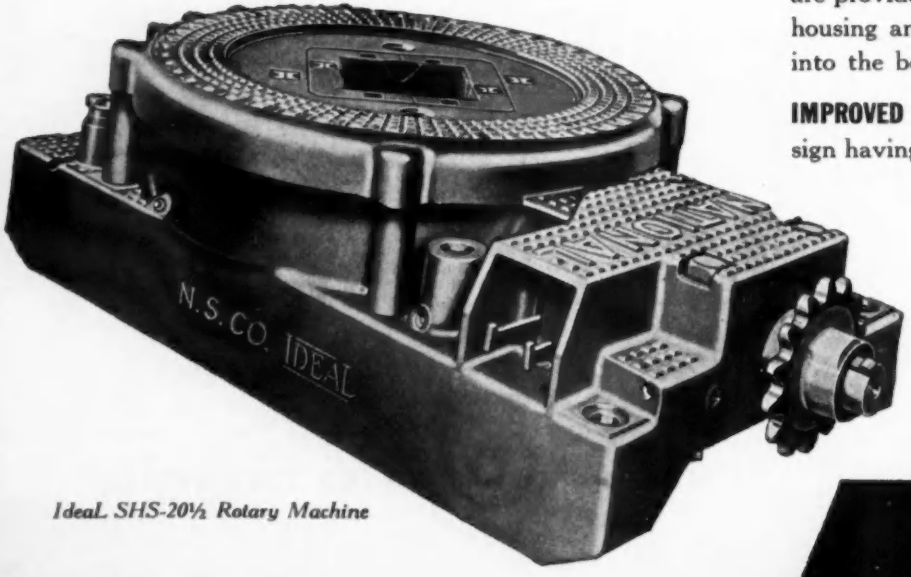


IdeaL FE-17½ Rotary Machine

IdeaL MS-20½ Rotary Machine



IdeaL SHS-20½ Rotary Machine

HERE ARE A FEW

SPIRAL BEVEL GEARS—Perfectly matched sets manufactured in our own factory from Ideal Electric Steel. Shock-resistant, spiral-cut teeth assure a smoother and quieter running machine.

FULLY ENCLOSED—Complete enclosure of these rotary machines permits proper lubrication without contamination by foreign matter.

PROVEN MAIN BEARING—Especially designed for high rotating speeds and heavy loads. Precision ground races are heat treated to obtain uniform hardness.

IMPROVED PINION SHAFT ASSEMBLY—Pinion shaft is mounted on a pair of roller bearings supported in individual housings secured to the under side of the base. The entire unit may be easily removed and all elements on the pinion shaft are removable over the sprocket end.

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ROTARY MACHINES

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base and enabling it to be quickly removed. It extends above the table top, thereby deflecting all mud that is thrown off during rotation.

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FE-12½—A light weight machine for shallow and "Slim Hole" drilling at average drilling speeds. Made with either 36" or 44" spacing between sprocket and table center.

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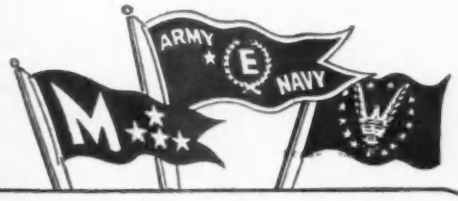
MS-20½—For deep drilling at medium high speeds.

SHS-20½—For the highest attainable drilling speeds and deepest drilling. The SHS-20½ is National's popular machine for superior high speed performance.



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Electrical Well Logging

PART 10

The response of a two-electrode curve is very critical to changes in hole size and in bed thickness. The present article explains how the true resistance of beds can be determined in many cases in spite of this limitation

By HUBERT GUYOD, Development Engineer
Halliburton Oil Well Cementing Company, Duncan, Oklahoma

The Two-Electrode Method

Use of the two-electrode curves—Effect of Mud drilling

ELECTRICALLY resistant beds are, perhaps, more important than conductive ones because many of them carry petroleum. Any logging system should therefore be designed to give good logs in most resistant sections. It has been seen that this result is obtained with the three-electrode and with the four-electrode methods, provided certain conditions are fulfilled. The preceding article showed that a similar remark can be made when the two-electrode arrangement is used. In order to determine more exactly the conditions under which this latter method will give satisfactory results, it is necessary to investigate in some detail the influence of all pertinent factors on the resulting log. From this investigation, the corresponding curves will be analyzed quantitatively, and the range of applicability of the method will be determined.

As usual, the resistivity of the object resistant bed (a sand, for example), that of the surrounding formation (shales), and that of the drilling mud, will be designated by ρ_2, ρ_1 and ρ_m, respectively, The following assumptions will be made:

1. The sand is nine times more resistant than the surrounding shale ($\rho_2 = 9\,\rho_1$).
2. The mud resistivity equals the shale resistivity ($\rho_m = \rho_1$).
3. All formations are homogeneous and isotropic.

The letters t, s, and d will denote the bed thickness, the electrode spacing CP, and the hole diameter, respectively. Numerical values different from those selected above would give similar qualitative results.

Curve 1 of Figure 9-9 (see Part 9, this series) representing the variations of apparent resistivity ρ_2' of the sand in terms of its relative thickness (i. e., in terms of $\frac{t}{s}$) is reproduced here as curve 1 of Figure 10-1 for convenience after having made a mnior change in the resistivity scale. This curve is useful when a large number of beds of different thickness are logged with one spacing, as for instance, when a well is logged with one given electrode arrangement. For the investigation under survey, it is preferable to analyze the changes in apparent resistivity of a given bed when the electrode spacing varies, all other factors remaining the same. This is given by the curve ρ_2' vs. s, or, more generally by the curve ρ_2' vs. $\frac{s}{t}$. This latter is, of course, the mirror image of curve 1 of Figure 10-1 $\left(\rho_2' \text{ vs. } \frac{t}{s}\right)$, and it is shown as curve 2 on this figure. These two curves (1 and 2) neglect the influence of the bore fluid. When the influence of the drilling mud contained in the bore hole is taken into account, the result cannot, unfortunately, be illustrated completely by one curve; a family of curves must be used, each curve of the family representing the result obtained for a given hole size. One of these curves has been established previously (curve 1′ of Figure 9-9), and it is reproduced here as curve 1′ of Figure 10-1. This curve represents the apparent resistivity in terms of relative thickness, namely ρ_2' vs. $\frac{t}{s}$, for a hole diameter d equal to 0.4 times the spacing s. If the mirror image of curve 1′ is plotted on Figure 10-1, curve 2′ is obtained. This curve shows the changes in apparent resistivity of a given bed in terms of spacings and for a hole diameter equal to 0.4 times the spacing. For curves 2 and 2′ of

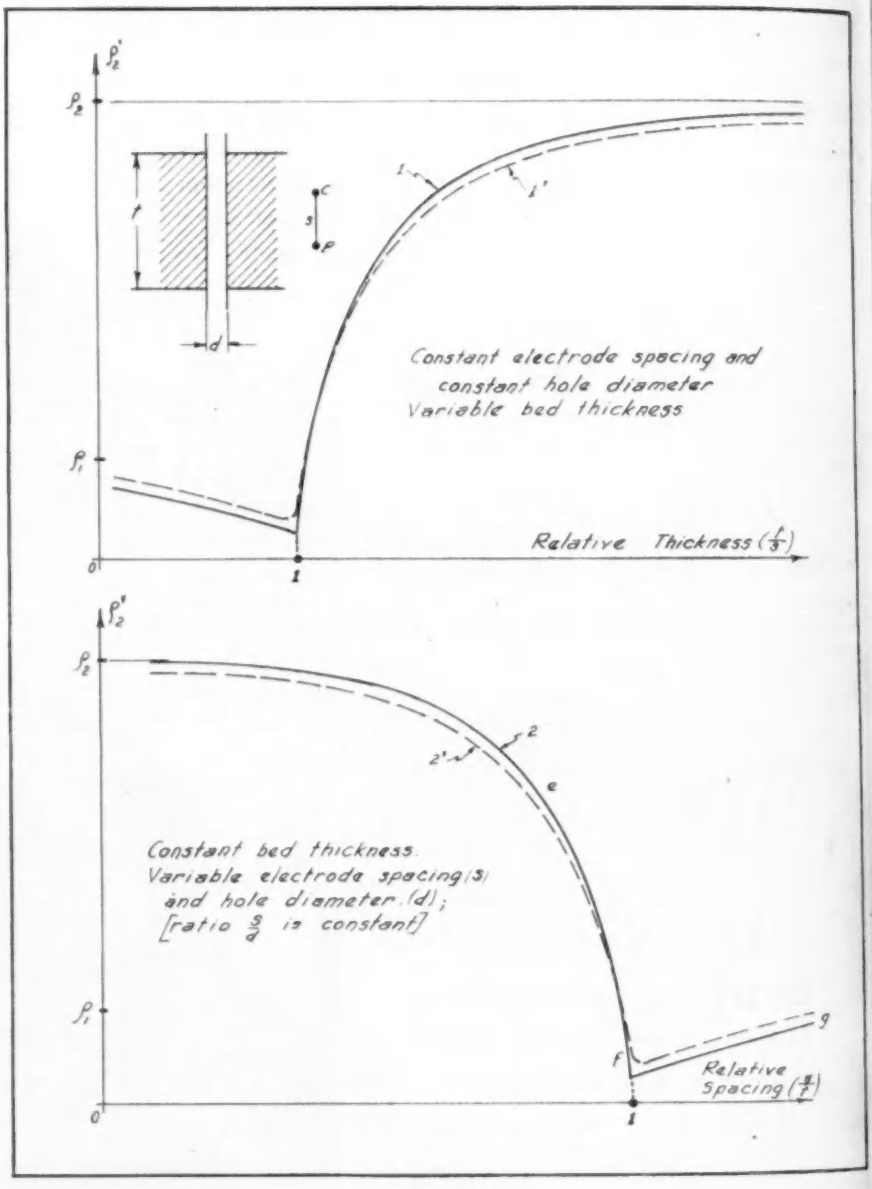
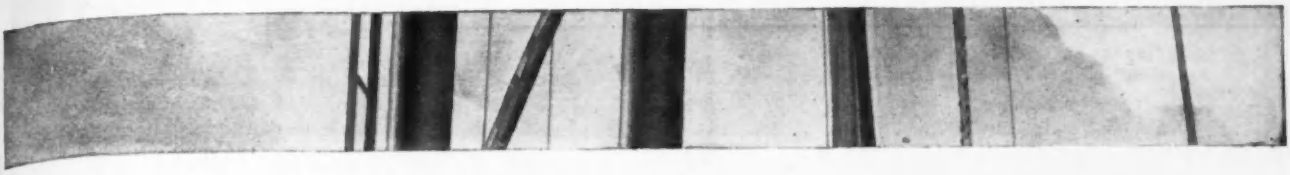

Constant electrode spacing and constant hole diameter
Variable bed thickness
Relative Thickness (t/s)
Constant bed thickness.
Variable electrode spacing (s) and hole diameter (d);
[ratio s/d is constant]
Relative Spacing (s/t)

FIGURE 10-1



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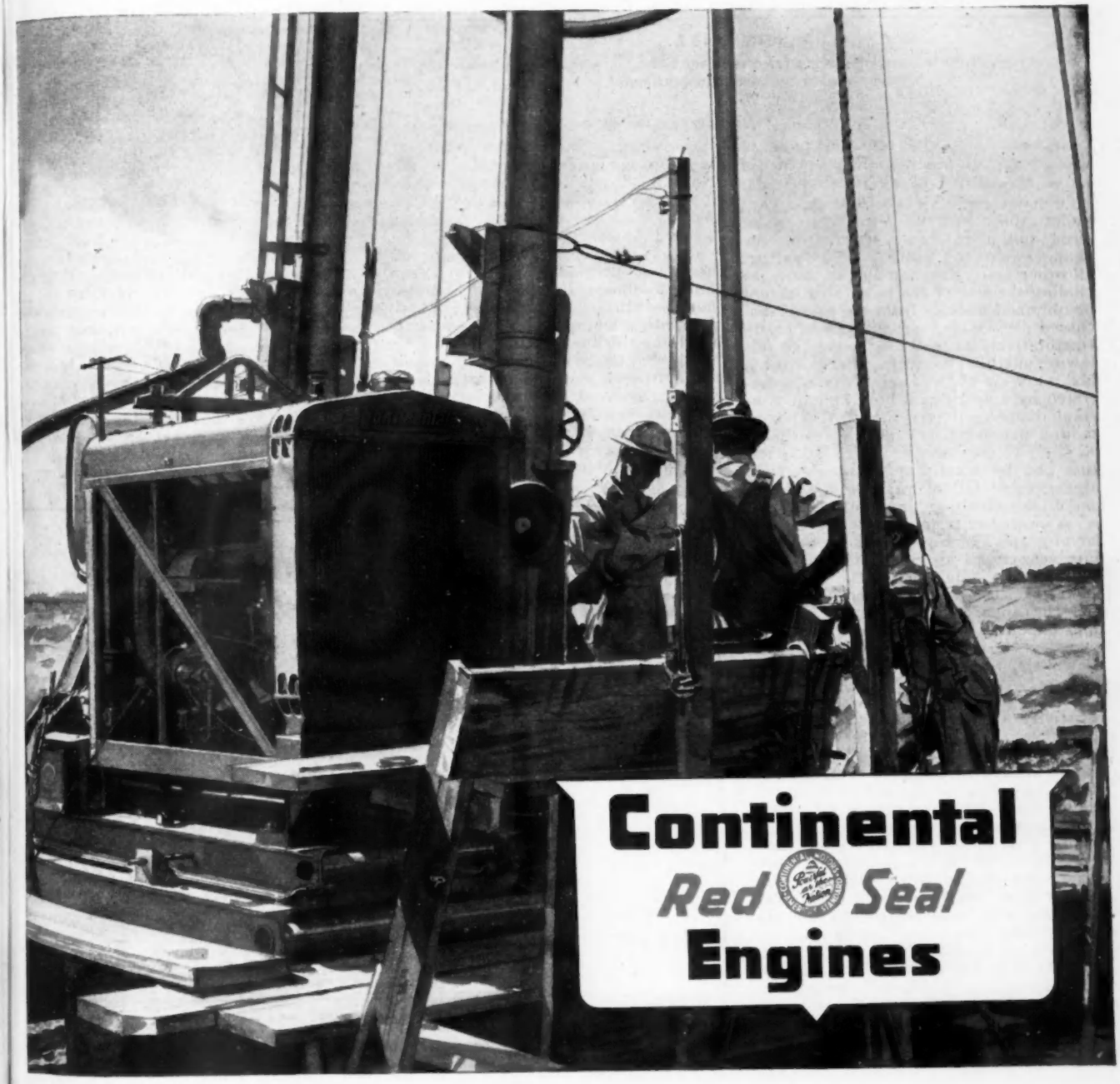

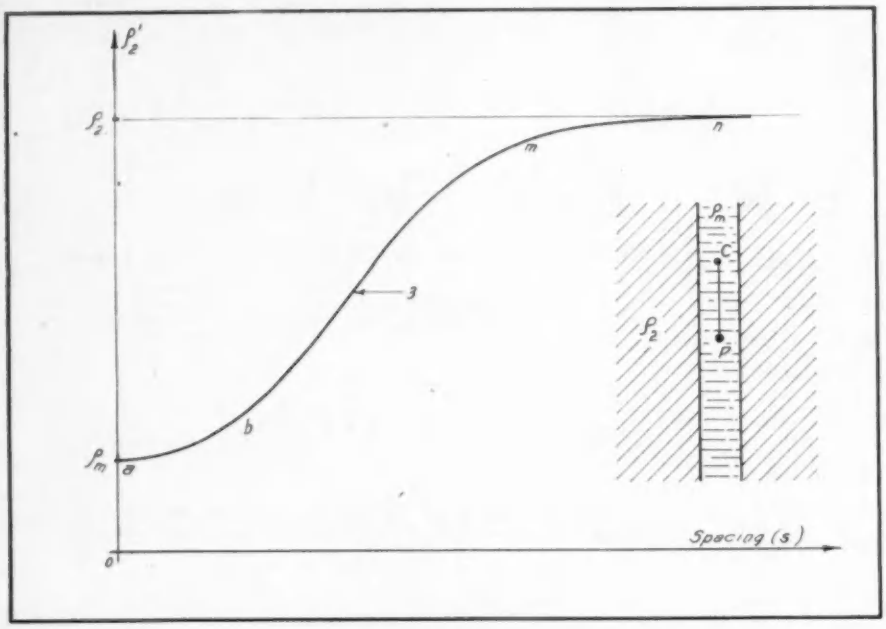

FIGURE 10-2

Apparent resistivity in terms of spacing for a resistant bed of infinite thickness, when the drilling mud is considered (approximate).

Figure 10-2, the spacing is assumed to change continuously from one point of the curves to another. Each point of curve 2′ will therefore refer to different hole diameters. This is, of course, a very undesirable result, because what is desired here is a curve representing the changes of ρ_2' as a function of spacing, all other factors remaining the same, including the size of the hole. This cannot be obtained directly from the curves discussed previously, but can be had easily (qualitatively at least) by using the following method. Consider the case of a bed infinitely thick of resistivity ρ_2, penetrated by a cylindrical bore hole of constant diameter d (see Figure 10-2) containing a conductive fluid of resistivity $\rho_m < \rho_2$. If measurements are taken on this bed by means of a two-electrode arrangement CP of variable spacing s, and if the resulting apparent resistivity ρ_2' is plotted in terms of s, a curve similar to graph 3 of Figure 10-2 is obtained. For very small spacings (for instance, less than one tenth of d), the measurement is related mostly to the bore fluid, and the apparent resistivity ρ_2' equals approximately ρ_m (section ab of the curve). For very long spacings (more than 20d), the influence of the mud is extremely small, and the apparent resistivity equals approximately the true resistivity ρ_2 of the bed (section mn of the curve). For intermediate values, ρ_2' will, of course, be comprised between ρ_m and ρ_2. What here is called the influence of the bore hole or the influence of the drilling fluid should, of course, be understood as meaning the influence of the drilling fluid filling the bore hole. Curve 3 is similar to curves obtained during surface exploration surveys when an extremely thick bed is overlain by a layer of smaller resistivity and measurements with increasing spacings are taken (see J. N. Hummel, A.I.M.M.E. Tech. Bull. No. 418). The two problems are, in fact, almost identical, the only difference being in the geometry of the medium of resistivity ρ_m. Curve 3, as given here, is only approximate, accurate quantitative data being unnecessary for the discussion. (Readers who are interested in investigating in more details the case of cylindrical boundaries can refer to W. R. Smythe, "Static and Dynamic Electricity," McGraw-Hill Book Co., New York.) This curve refers to a bed of infinite thickness cut by a bore hole of constant diameter, and it may not be used without modifications for a bed of finite thickness. For beds of finite thickness the corresponding curve is obtained as follows: when very small spacings are used, the thickness of the bed under survey is relatively large and, for all practical purposes, can be considered as being infinite. Curve 3, therefore, may be used in the corresponding range of thickness, perhaps from a to b. This section, ab, has been drawn in solid line on Figure 10-3, after having changed the abscissas from s to $\frac{s}{t}$ in order to give the result more generality. When larger spacings are used, curve 3 of Figure 10-2 may not be used; however, for such spacings the influence of the bore hole is usually negligible and curve 2 of Figure 10-1 (which was established by neglecting the influence of the bore hole) may be used in the corresponding range of thickness, for example, from e to g. This section eg is reproduced as solid line efg in Figure 10-3. By joining sections ab and efg by an arc such as bcde, the curve abcdefg is obtained. This curve represents the apparent resistivity of a resistant bed of finite thickness in terms of electrode spacing, the influence of the mud being taken into account (constant hole diameter). Of course, the ordinates of the curve of Figure 10-3 may be so selected that they will represent relative apparent resistivities, instead of absolute values if it is desired. Figure 10-3, then, gives the variations of $\frac{\rho_2'}{\rho_1}$ in terms of $\frac{s}{t}$. This latter expression, $\frac{s}{t}$ is usually called the "relative spacing." When no confusion is likely to arise, the word "relative" will frequently be omitted in the following discussion.

The preceding method used to derive one curve from two graphs having different ranges of applicability is not new. It has been used before, for example, for certain problems related to surface exploration (see J. N. Hummel, op. cit.).

Effect of Bed Thickness

If the thickness of the bed under investigation varies, but the hole diameter does not change, then, of course, the shape of the resulting curve will change. Its character, however, remains basically the same, as long as the electrode spacing is not too small (less than the hole diameter), a case which will not be considered here because of its lack of practical applications. For example, curve B of Figure 10-4 refers to a bed B whose thickness is ten times the hole diameter (= 10d). This curve shows that, when the spacing s is small (less than 0.1t), the measurement gives low values be-

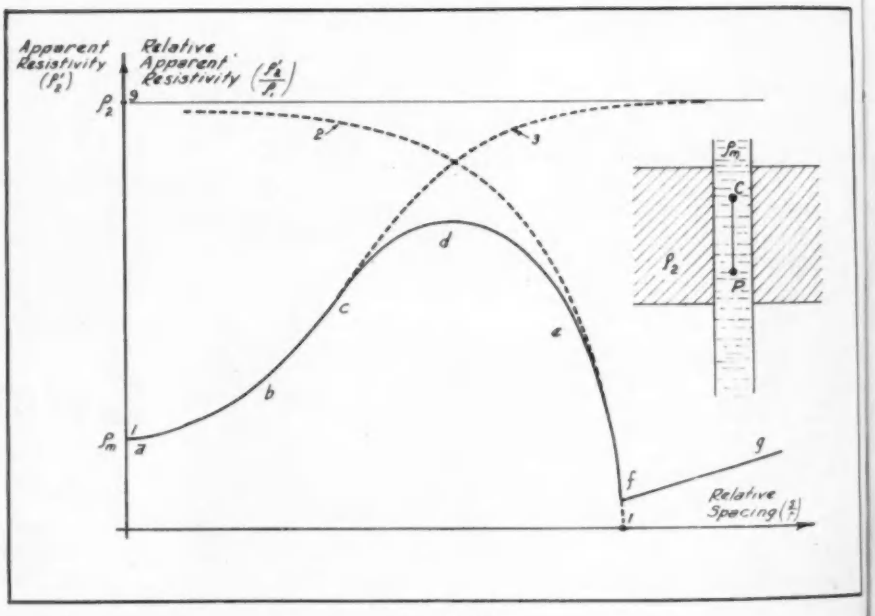

FIGURE 10-3

Apparent resistivity in terms of spacing for a resistant bed of finite thickness, when the drilling mud is considered (approximate).

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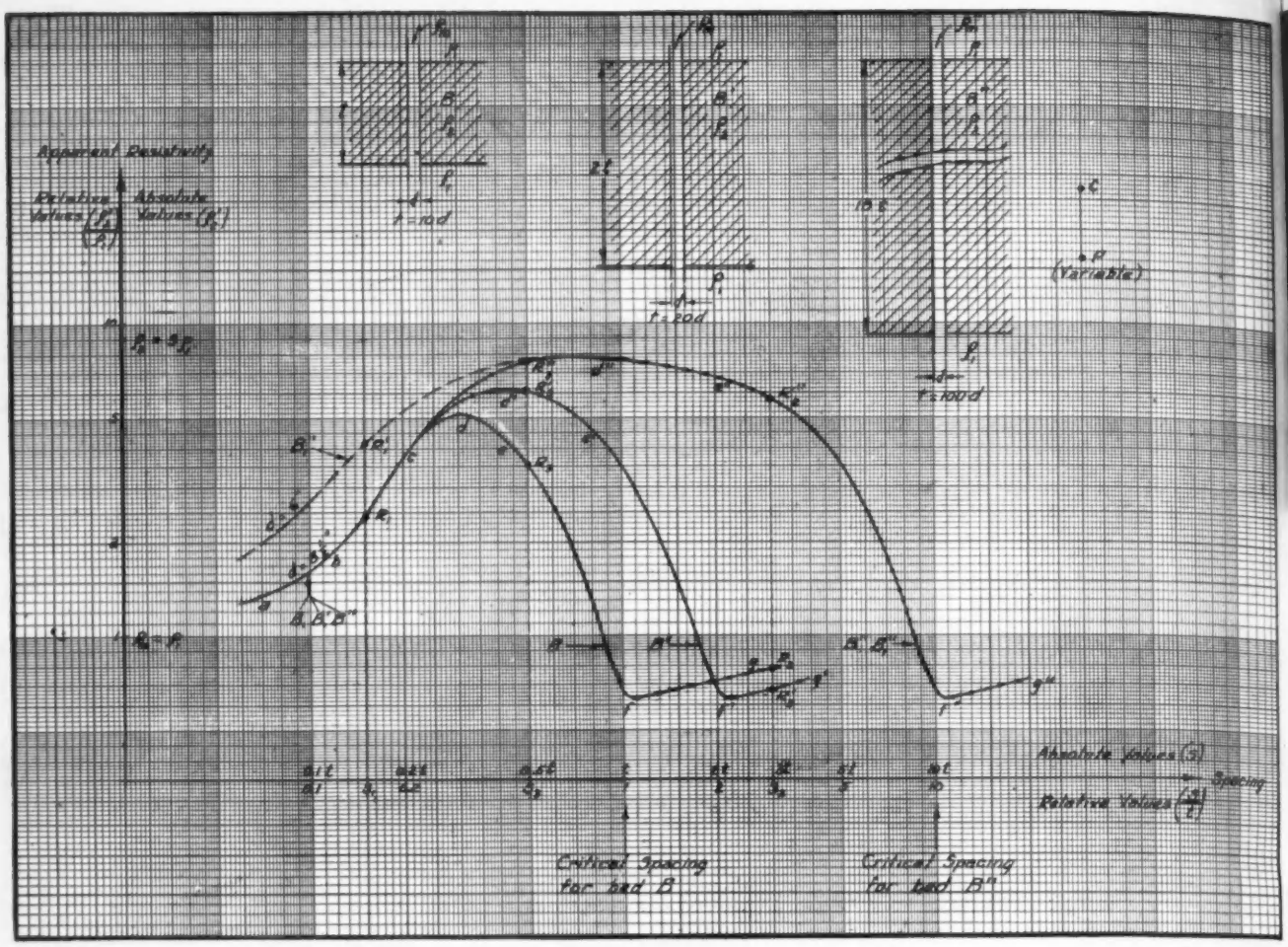

FIGURE 10-4

Apparent resistivity of resistant beds in terms of electrode spacing (Two-electrode method).

cause it is related mostly to the mud contained in the hole. The apparent resistivity is therefore close to the mud resistivity (part ab of the curve). When very long spacings are used ($s > t$), ρ_2' is again extremely small because the bed thickness is less than the critical thickness (this was explained in detail in Part 9 of the series). Only when the spacing is comprised between perhaps 0.2t and 0.5t, is the apparent resistivity of the same order as the true resistivity (part cde of the curve). The relatively sharp break of the curve at f occurs when the spacing is approximately equal to the bed thickness t. It is convenient to refer to this spacing as the "critical spacing."

As pointed out above, the thickness of bed B is assumed to be equal to ten times the hole diameter. If the hole has a diameter of about 8½ inches, the bed under survey is therefore approximately 7 feet thick. Suppose now that it is desired to investigate the case of a bed B′ twice as thick, that is, of thickness $2t = 14'$, the size of the hole remaining the same as it was previously (8½ inches). For this bed, curve B′ is obtained. As the size of the bore is not changed, the influence of the mud, on curve B′, will be the same as on B when small spacings are used. The corresponding section of the curve will be the same for B′ as it was for B (section ab). For somewhat larger spacings, however, the apparent resistivity will be greater for B′ than it was for bed B because of the greater relative thickness of the object bed. This gives part cd′e′ of curve B′. For very large spacings, arc f′g′ is obtained, the minimum of which corresponds to a spacing approximately equal to 2t, the thickness of bed B′ (critical spacing for bed B′). A little thought will show that arc e′f′g′ is nothing more than arc efg displaced from t to 2t, in order to take into account the change in bed thickness from t to 2t. It is clear from an inspection of curve B′ that a range of spacings approximately twice as large as for bed B will give, for bed B′, an apparent resistivity of the same order as the true resistivity (part cd′e′ of the curve). This range will be, perhaps, 0.2t to t.

Now, if a bed B″, ten times as thick as B, is investigated, the resulting curve B″ shows that a reasonably high apparent resistivity will be obtained in the range 0.2t to 5t, namely, in a range about ten times greater than that corresponding to bed B. If the thickness of the object bed were increased still further, the width of the resulting curve giving the apparent resistivity in terms of spacing would increase accordingly, and so would the range of spacings giving a satisfactory two-electrode curve.

If curves B, B′ and B″ are compared, it can be observed that an increase in bed thickness brings the corresponding curve higher and higher, namely, yields apparent resistivity values which are closer and closer to the true resistivity of the bed (sections d, d′, and d″ of the curves).

Effect of Hole Diameter

If the preceding experiments are repeated on the same beds, for instance, on bed B″, but for a smaller hole size (perhaps 6 instead of 8½ inches), curve B_1'' is obtained. When very long spacings are used, the influence of the bore hole is negligible, as it was for curve B″. In this range, B_1'' will therefore be almost identical with B″. When short spacings are used, the influence of the drilling fluid is less for curve B_1'' than for curve B″, and the apparent resistivity will, consequently, be higher. In this range of spacings, curve B_1'' will be above curve B″.

The points of the curves B, B′, etc.—beyond which the influence of the bore fluid is negligible are e, e′, etc., respectively; they are very nearly the highest points d, d′, etc.—of the curves.

From the foregoing discussion it is now possible to formulate the conditions under which a two-electrode curve will give a satisfactory log on resistant beds.

Obtaining a Good Two-Electrode Curve

Good logs will be obtained when the apparent resistivity ρ_2' is as close as possible to the true resistivity ρ_2 of the object bed. Suppose that a spacing such as $S_1 = 0.15t$ is used, and that the hole diameter d is 8½ inches. The corresponding apparent resistivity is approximately the same for the three beds B, B′ and B″, and its numerical value is

$$R_1 = 2.45\rho_1 = 27\% \text{ of } \rho_2$$

If the hole diameter were 6 instead of 8½ inches, the log would give a different value; namely,

$$R_1' = 4.1\rho_1 = 45\% \text{ of } \rho_2$$

These two figures show that, for a given spacing s, the smaller the hole diameter d, the better the apparent re-

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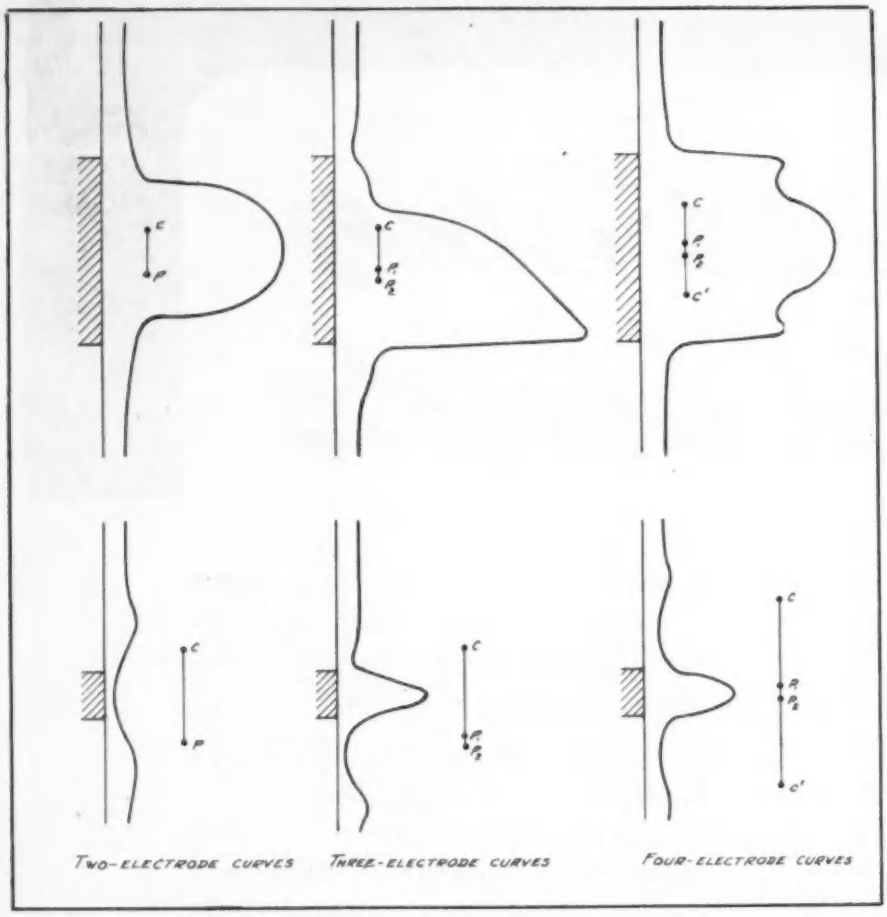


FIGURE 10-5 (Above)
Comparison between two-electrode, three-electrode and four-electrode curves.

sistivity value. This means that the ratio $\frac{d}{s}$ must be selected as small as possible. As the hole diameter cannot, evidently, be selected at the time an electric log is made, the only means of keeping the ratio $\frac{d}{s}$ small is to use very long spacings. In practice, it is desirable to select the largest spacings compatible with other requirements, and preferably not less than twice the hole diameter when quantitative data is desired.

If very long spacings are used, for instance, $S_2 = 3t$, it can be seen on Figure 10-4 that beds B, B′ and B″ will give the following apparent resistivities, respectively,

$$R_2 = 0.8\rho_1 = 8.9\% \text{ of } \rho_2$$
$$R_2' = 0.67\rho_1 = 7.5\% \text{ of } \rho_2$$
$$R_2'' = 5.7\rho_1 = 63\% \text{ of } \rho_2$$

These values are decidedly unsatisfactory for beds B and B′.

If the spacing is reduced to $S_2 = 0.5t$, the three apparent resistivities are:

$$R_2 = 3.5\rho_1 = 40\% \text{ of } \rho_2$$
$$R_2' = 6\rho_1 = 67\% \text{ of } \rho_2$$
$$R_2'' = 7.5\rho_1 = 83\% \text{ of } \rho_2$$

which, as a whole, are more acceptable values.

Selection of the Electrode Spacing

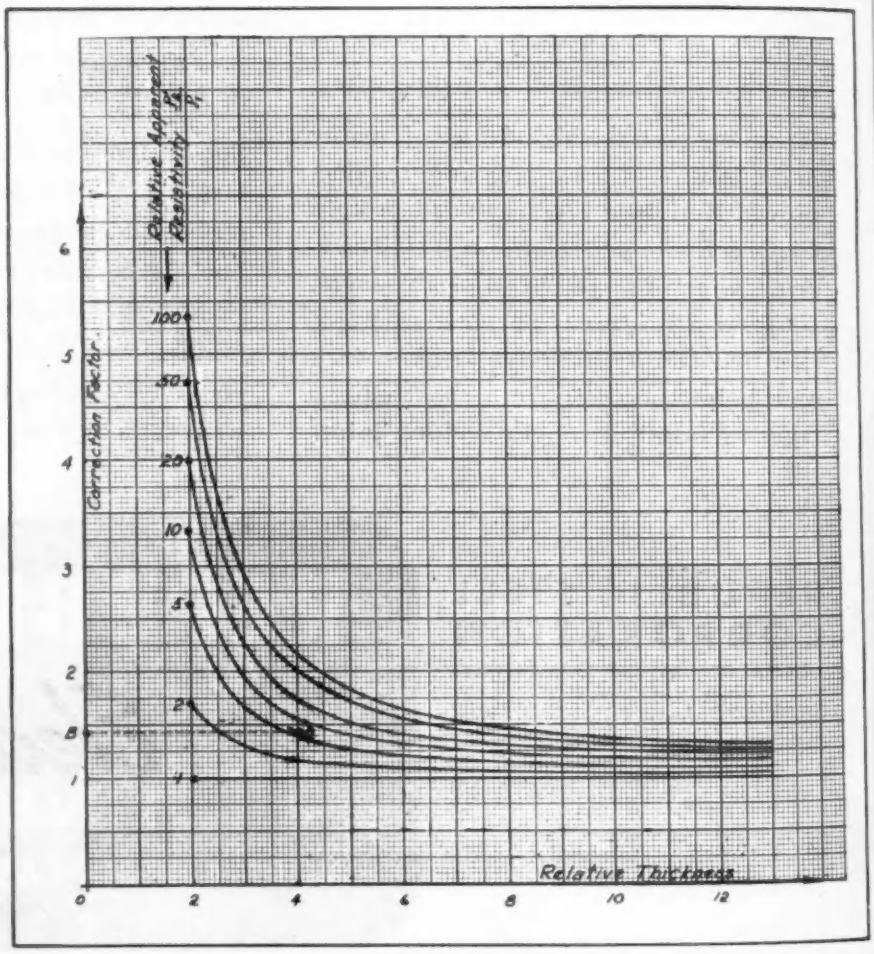
The foregoing figures show that if a very long spacing is used, only thick beds give a satisfactory log. If the spacing is reduced, thinner beds give an acceptable log. This reduction should not be carried too far, however, because it would bring the operating point of the curves of Figure 10-4 too far to the left, namely, in a region where the apparent resistivity value is low again because of the influence of the mud. One has then to face the following dilemma: if the spacing is long, good resistance values are obtained in general, but thin beds cannot be seen on the log; if the spacing is short, most beds are seen on the log, but the apparent resistance is much affected by the mud. A compromise or a sacrifice must therefore be made. A compromise being usually unsatisfactory here, it is better to accept a sacrifice. The decision to be made as to what should be sacrificed depends upon the purpose of the log.

If the two-electrode curve is used to log accurately changes in lithology (problem of correlation), then it is advisable that as many beds as possible be found on the log. Short spacings like S_1 are therefore to be used. Of course, the resistance values given by this log will be much smaller than the actual value but this is unavoidable.

If accurate resistance values are desired (problem of fluid determination) then larger spacings will have to be used (like S_2); the thinner beds will give a very poor response on the log and the desired result will be obtained only on relatively thick beds.

If accurate resistance determinations are required on thin beds as well as on thick ones, no two-electrode spacing can be found which will solve this problem. Another logging method (three-electrode

FIGURE 10-6 (Below)
Chart giving correction factor for computing the true resistivity of thick resistant beds (Two-electrode method).



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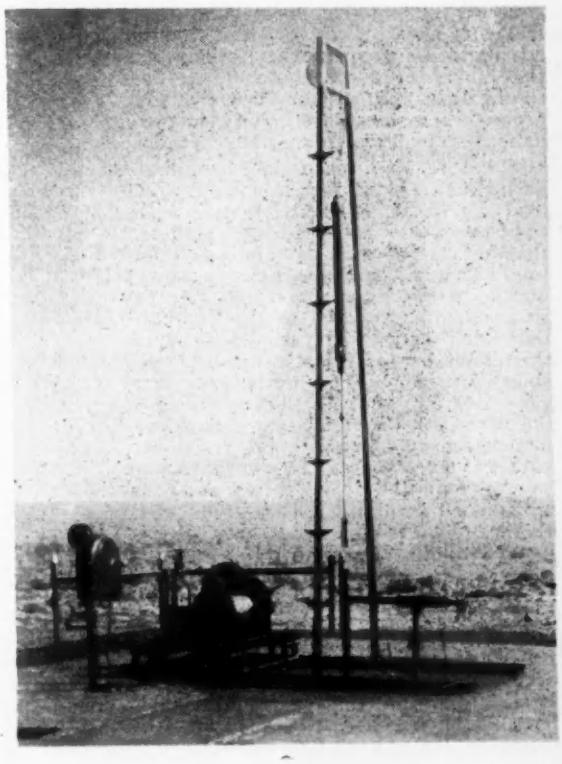

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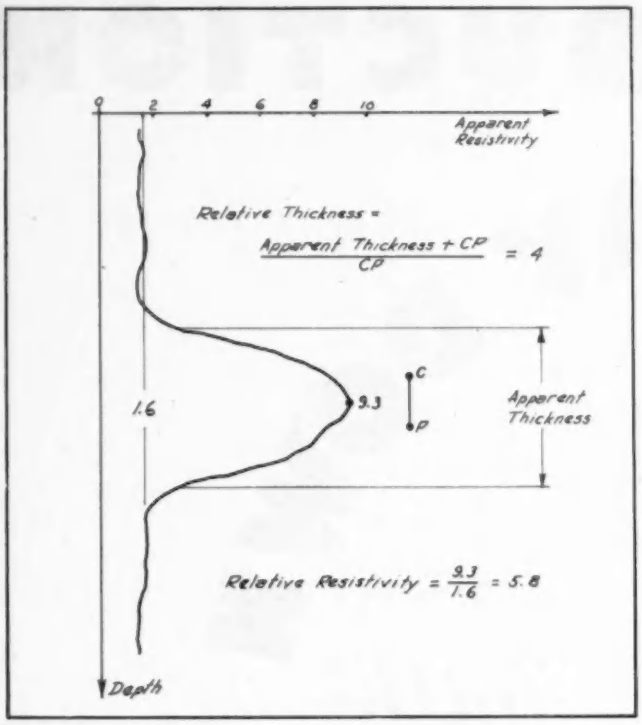


FIGURE 10-7
Determination of the true resistivity of a resistant bed (Two-electrode method).

method, for instance) will have to be used.

It is interesting to put the preceding facts in figures. If it is desired that the log gives directly the resistivity of the object bed with an error less than 15 percent, then it can be seen by referring to Figure 9-9 (see preceding article) that the spacing must be less than one-eighth the bed thickness. In other words, an electrode spacing of 20 inches will give quantitatively good logs only on bed thicker than

$$20 \times 8 = 160'' = 13.3 \text{ feet}$$

The apparent resistivity given by this spacing on beds thinner than 13 feet will be substantially lower than the true resistivity. In practice, a spacing of 20 inches is approximately the smallest spacing to be used in order to eliminate the influence of the bore fluid. This shows how unsatisfactory two-electrode curves are for direct resistivity determinations on beds which are not very thick.

The foregoing discussion has disregarded entirely another important practical requirement, namely, that of sufficient penetration. It will be remembered that because of mud contamination, 10-foot spacings (and sometimes larger ones) are usually necessary to give resistance values related to the non-contaminated sections of many sands. When this condition (a 10-foot spacing) is associated with the preceding remark (good log only on beds thicker than 8s), one arrives at the result that a good log, namely, a log giving good resistivity values and not affected by mud invasion, can be expected from a two-electrode arrangement only if the beds are at least $10 \times 8 = 80$ feet thick. Such beds are unfortunately the exception, rather than the rule. With such a long spacing, all resistant beds less than 12 feet thick would appear, on the log, to be conductive beds. Those whose thickness is comprised between 12 and 20 feet would give a very indefinite response on the log. It is clear therefore that spacings of such length cannot be used with the two-electrode method and that the penetration must usually be sacrificed.

In view of the average thickness of the permeable formations found in petroleum areas, it is advisable to keep the electrode spacing below 4 feet when an acceptable log on most beds is desired. On the other hand, the spacing must be larger than 20 inches in order to keep the influence of the bore hole small. A good value is around 2½ feet. The penetration given by such spacings often will be sufficient for a large number of beds, because many permeable formations are only moderately invaded by the drilling fluid. It is well to remember, however, that the penetration will be insufficient for many other beds and that another curve having a much longer spacing (by necessity a three-electrode or a four-electrode curve) must be obtained if information regarding the fluid content of permeable formations is desired.

Uses of Two-Electrode Curves

Two-Electrode curves being quite critical, their use is restricted to the solution of a few problems; the most important of them are discussed below.

1. *Qualitative Permeability Determination.* It has been shown in Part 3, when discussing the single-point resistance method, that a comparison between two curves having different penetration will show, in many instances, whether the beds logged are permeable or not. A two-electrode curve made with a short spacing (of the order of one foot) will give a resistance log which, usually, will be related more to the invaded zone of permeable beds than to the original fluid. This curve, when compared to another curve obtained with a much longer electrode spacing, will therefore be of value for the location of many sands, especially salt water sands. It will give results similar to those obtained from a single-point resistance curve, and can therefore be used instead of the latter, if desired.

2. *Lithological Changes.* A two-electrode curve made with a very short spacing can be used for recording lithological changes. If the electrode spacing is made

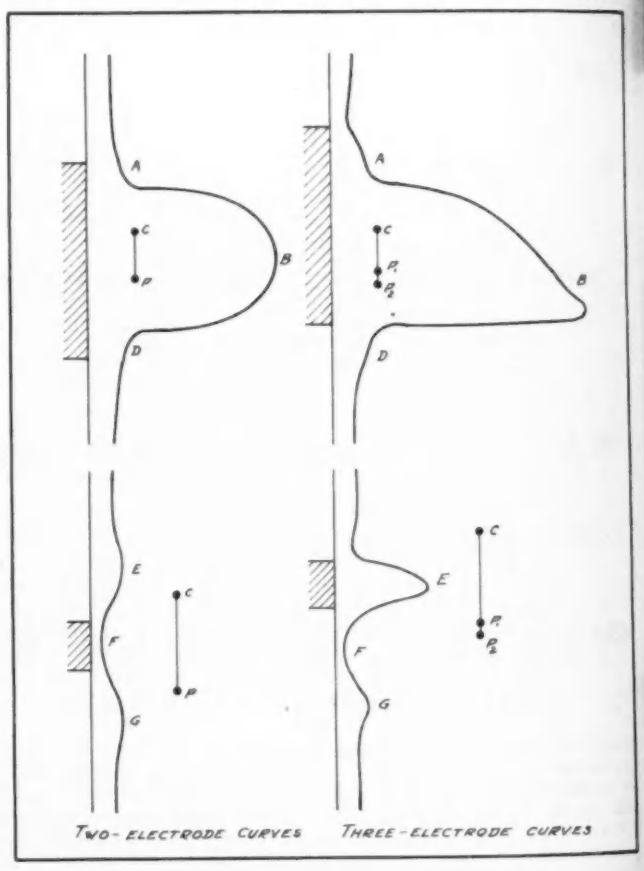
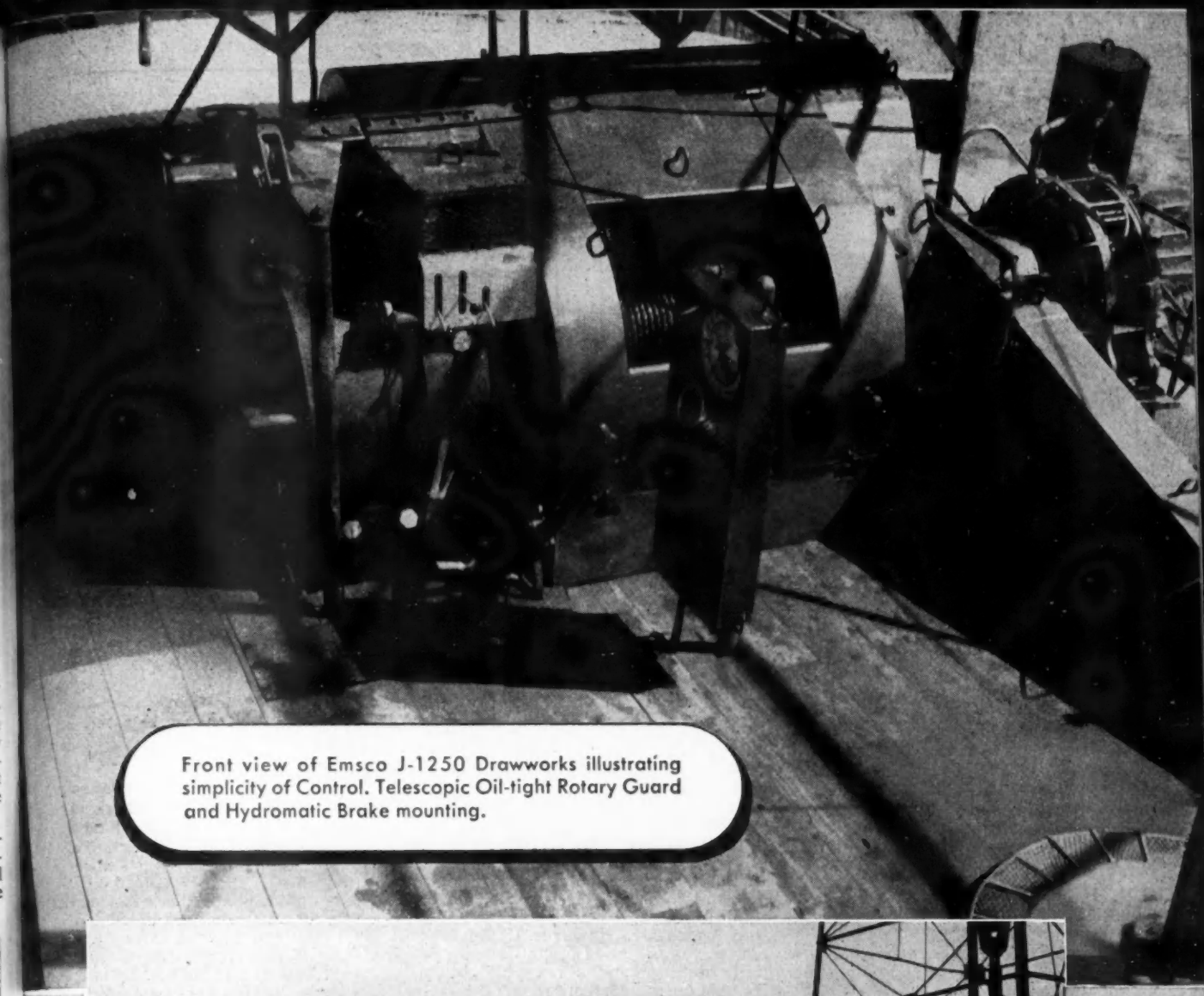
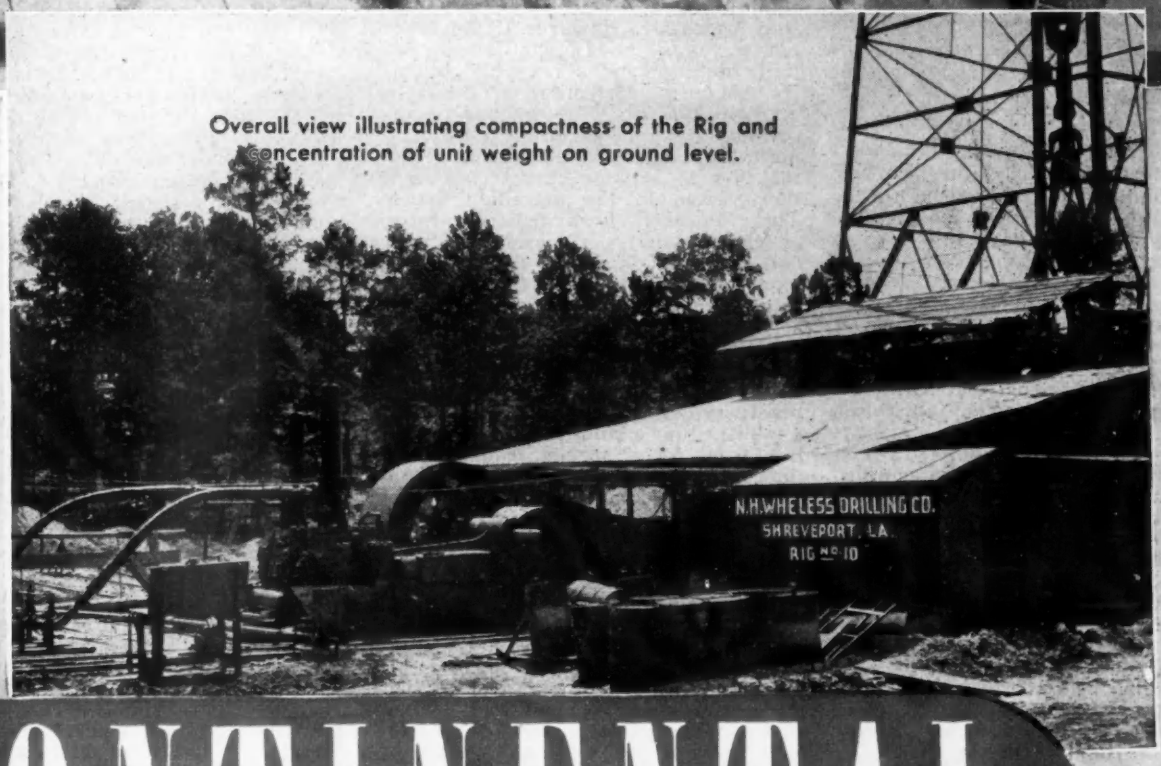


FIGURE 10-8
Basic similarity between two-electrode and three-electrode curves.



Front view of Emsco J-1250 Drawworks illustrating simplicity of Control. Telescopic Oil-tight Rotary Guard and Hydromatic Brake mounting.



Overall view illustrating compactness of the Rig and concentration of unit weight on ground level.

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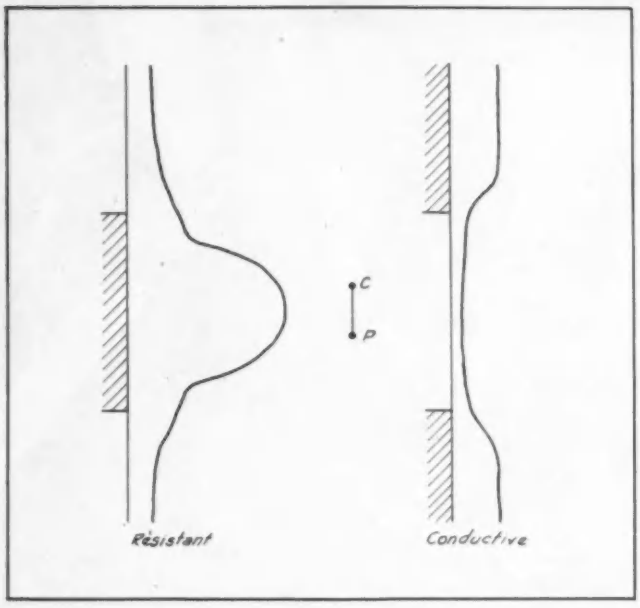

FIGURE 10-9
Distinction between a thick resistant bed and a thick conductive bed (Two-electrode method).

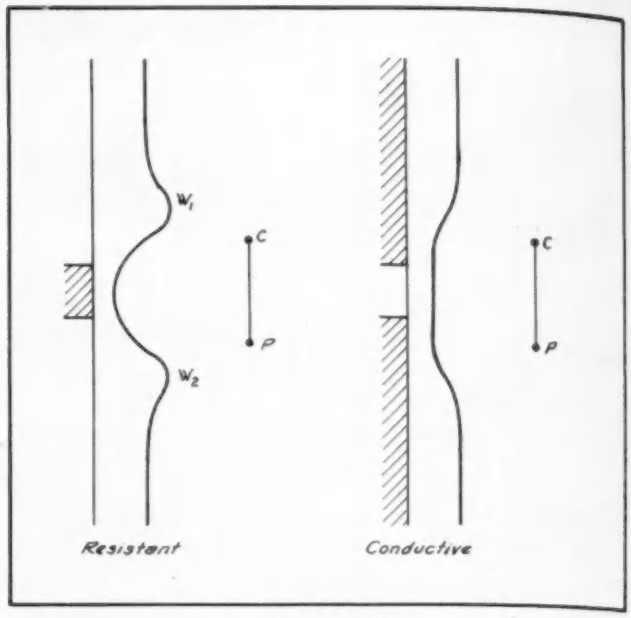

FIGURE 10-10
Distinction between a thin resistant bed and a thin conductive bed (Two-electrode method).

sufficiently small (6 to 12 inches, for instance), the measurement averages the resistance of only a thin section, and changes in lithology will be denoted with sharp definition. Almost every bed will be shown individually on the log; this log therefore will be a good correlation curve. The bed thicknesses given by this curve are approximately correct (the error is equal to the spacing length, which is negligible). The apparent resistivity given by such a small spacing is evidently much influenced by the drilling mud and, therefore, cannot be used for resistivity determinations.

It has been seen in Part 9 of this series that a two-electrode curve shows some distortion in shales on each side of the sand on a length equal to the spacing. When very small spacings are used, the distortion has only a short vertical extension, and the curve appears therefore much less distorted than parent curves of the composite electric log obtained with a much longer spacing (18 foot three-electrode curve, for instance). This, however, should not be interpreted as meaning that two-electrode curves are, basically, much less distorted than three-electrode or four-electrode curves. This is not true. The amount of distortion is of the same order for all curves when the same spacing lengths are used. This is illustrated on Figure 10-5 where the curves from left to right represent the logs obtained with a two-electrode, a three-electrode, and a four-eltctrode arrangement, respectively, the same spacing being used for all the arrangements. The top curves refer to a thick bed, and the bottom ones to a thin bed. It can be seen that the average amount of distortion is approximately the same for all curves, either in the sand or in the shales. In practice, any multiple-electrode curve of the types described in these articles will exhibit only small distortion when the spacing is short. This distortion, therefore, will be hardly noticeable, and the log will give a relatively good picture of the lithological changes. On the other hand. any curve obtained with long spacings will appear to be considerably distorted, regardless of its type.

3. *Determination of the Resistivity of Resistant Beds.* When a long two-electrode spacing (of the order of several feet) is used, the influence of the mud is relatively small, and the apparent resistivity of thick resistant beds will often be close to the true resistivity. That of thinner beds will be too low, and therefore inaccurate. However, if the bed is not too thin, good quantitative resistivity determinations may be obtained by making a correction on the value read on the log. The amount of this correction can be determined by curve matching, namely, by comparing the actual log to sets of curves similar to those given in the preceding article. This, however, is a tedious process which necessitates a considerable number of curves previously established. A more convenient method consists in translating these curves in the form of a chart, like that of Figure 10-6, which gives the theoretical number by which the maximum apparent resistivity must be multiplied in order to give the true resistivity. The chart of Figure 10-6 was established for a mud resistivity ρ_m equal to ρ_1 and for a spacing equal to 2½ times the hole diameter. To be complete, similar data should be given for a wide range of mud resistivities and hole diameters. This, however, would become too involved and will not be attempted. Furthermore, it is not really necessary since most cases can be satisfactorily solved by referring to the chart of Figure 10-6. In fact, as remarked in the preceding article, this chart can be used safely over a relatively wide range of conditions, for instance, when ρ_m is comprised between ⅓ ρ_1 and 5 ρ_1, and when the spacing is equal from 2 to 3 times the hole diameter. Although this chart applies strictly to homogeneous beds, it can be used also on rougly homogeneous beds moderately invaded by the drilling fluid. It gives data only for beds of relative thickness greater than 2. Reliable data for thinner beds cannot be given because of the uncertainty of the large correction necessary.

The correction chart is used as follows: Suppose that the resistivity of the resistant bed illustrated on Figure 10-7 is desired. After ascertaining that the requirements mentioned in the foregoing paragraph for applicability of the chart are fulfilled, the next step is to determine the relative thickness and the relative apparent resistivity of the bed. As has been explained in the preceding article, the thickness of the bed equals the apparent thickness as measured on the log ($3 \times$ CP in the case of Figure 10-7) plus the length of the spacing (CP), namely $4 \times$ CP. The relative thickness, therefore, equals 4. The relative apparent resistivity equals the maximum value read on the log (9.3) divided by the average resistance in shales (1.6) The result is

$$\frac{\rho_2'}{\rho_1} = \frac{9.3}{1.6} = 5.8$$

The curve 5.8 is then selected on the chart (usually it is necessary to obtain it by interpolation). The ordinate B of the point A of this curve whose absissa is 4 (relative thickness) gives the correction factor. In the present example this number is found to be 1.43. Multiplying the maximum apparent resistivity 9.3 by the correction factor 1.43 gives 13.3 which is, most likely, a good approximation of the true resistivity of the bed of Figure 10-7.

From the shape and values of the curves of Figure 10-6 it can be seen that for relative thicknesses smaller than 2, no variable is really critical because the correction factor varies relatively little when conditions change. This explains why the range of applicability of the chart may be extended safely to the values mentioned previously.

4. *Field Operations.* The signal level of a two-electrode curve is much greater than that of a three-electrode or four-electrode curve having the same spacing. This might be of some value as far as

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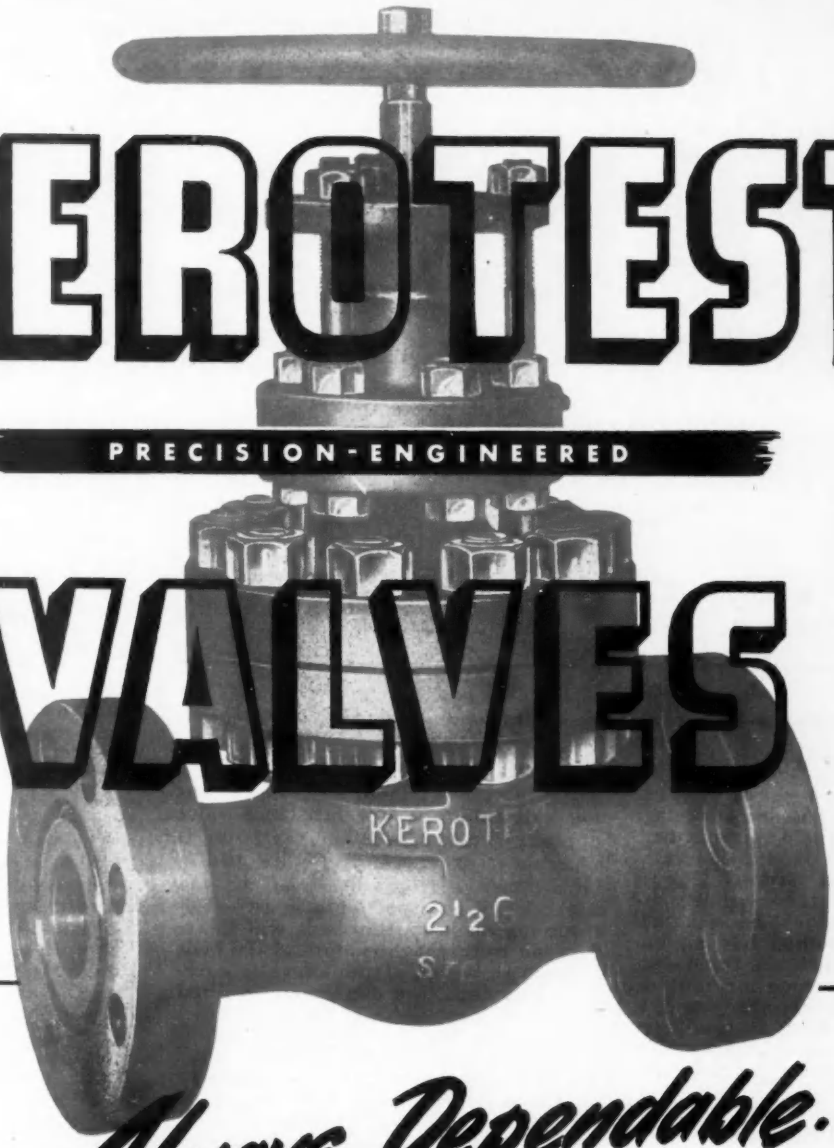

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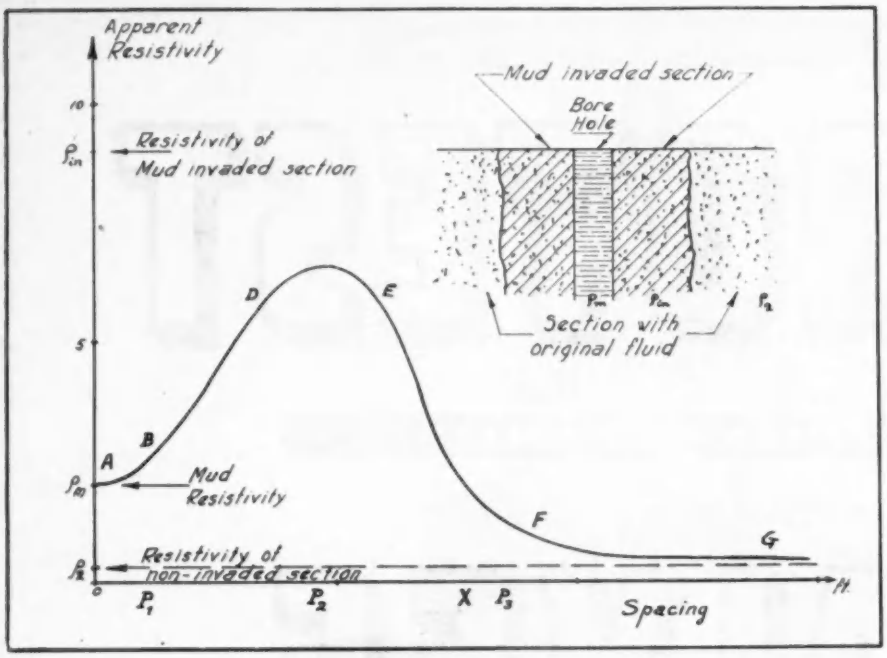

FIGURE 10-11

Changes in apparent resistivity in terms of electrode spacing for a mud invaded salt water sand (approximate).

field operations are concerned. This, probably, is the only possible advantage which the two-electrode arrangement has over the other methods. In fact, if the properties of the various logging systems discussed in these articles are carefully compared, it will be seen that the two electrode method has no important advantage which the three-electrode or the four-electrode methods do not possess also. On the other hand, it has an important limitation (poor response on thin beds) which is not nearly as critical with the other logging systems.

Miscellaneous Properties of Two-Electrode Curves

1. *Similarity with Three-Electrode Curves.* An interesting property of the two-electrode method is that it gives curves which are, roughly, similar to three-electrode curves. This is shown on Figure 10-8 where the physical correlation points are shown by the same letters. To facilitate comparison, one of the curves has been vertically displaced with respect to the other.

2. *Distinction Between Conductive and Resistant Beds.* Thick beds logged by the two-electrode method give a curve which is readily interpretable if there is only a moderate amount of mud invasion. The corresponding section of the curve is relatively high if the bed is resistant (left curve of Figure 10-9). It is lower than in the shale when the bed is conductive (right curve of the figure). Conversely, if a log like the left curve of Figure 10-9 is obtained, and one knows that there is little mud contamination (bed freshly drilled, or cable tool hole in which a small amount of viscous mud has been dumped, for example), then one can safely tell that the object bed is resistant. Similarly, if a log like the right curve of Figure 10-9 is obtained, one can be certain that the object bed is conductive, provided it is thick.

When the object bed is thin, the problem is more complex, because the log will exhibit a low resistance value opposite the bed, whether the latter is resistant (left curve of Figure 10-10), or conductive (right curve of the figure). A casual inspection of a two-electrode log made on thin beds will therefore fail to reveal the nature of the beds logged. However, if the curve is carefully examined, the doubt can be lifted in many instances. In fact, when the bed is resistant, there are two small peaks W_1 and W_2, one on each side of the bed, slightly higher than the resistivity of shales. Such peaks are not to be seen when the bed is conductive. This feature is very reliable, and it can invariably be seen on actual logs unless the object bed is in an extremely broken section.

If the extension of the mud contamination is unknown, the problem is much more difficult because a conductive bed reacts like a resistant one. Often the doubt can be eliminated only by referring to other curves (long spacing) of the composite electric log. In this connection, a method often proposed is that of having a set of two-electrode curves made with different spacings on the object bed and plotting the apparent resistivity of this bed in terms of spacing. The resulting plot obtained when the bed is conductive and is contaminated with a relatively resistant mud, has already been discussed in a preceding article (Figure 9-21). It is reproduced here as Figure 10-11 for convenience. When moderate spacings (like P_2) are used, the log exhibits relatively high values, because the measurement is related largely to the mud invaded zone (section DE of the curve of Figure 10-11). When larger spacings are used, such as P_3, the apparent resistivity is much less, because the measurement penetrates more into the non-invaded zone of the sand (point F). Finally, with still larger spacings the penetration is so great that the log gives an extremely low value, almost equal to the resistivity ρ_2 of the non-contaminated sand (point G). In non-consolidated salt water sands this resistivity ρ_3 is usually less than the resistivity ρ_1 of the associated shales. The converse of the foregoing is, unfortunately, not necessarily true, namely, if a curve like that of Figure 10-11 is obtained on a sand, this sand is not necessarily a conductive bed contaminated by the drilling fluid. It can be a resistant bed. This is evident when Figure 10-11 (conductive bed) is compared to one of the curves, B for example, of Figure 10-4 (resistant bed). These curves have the same shape, in particular, both exhibit a characteristic break at F and f, respectively. A casual glance at one of these curves would therefore fail to indicate whether the bed under survey is resistant or conductive. A closer inspection will reveal, however, an important difference, which in most cases eliminates all doubt. Break f of Figure 10-4 corresponds to the critical spacing, whereas break F of

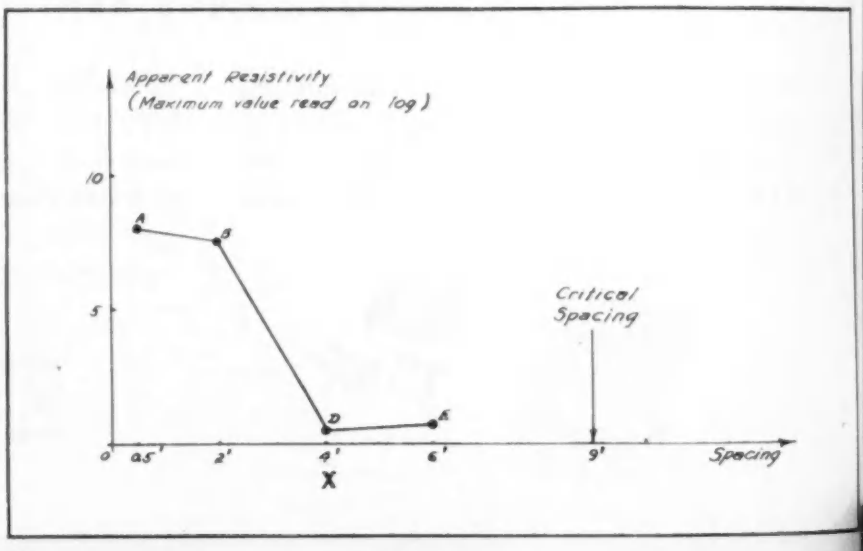

FIGURE 10-12

Determination of the electrical nature of a permeable bed by the use of several electrode spacings (conductive bed).

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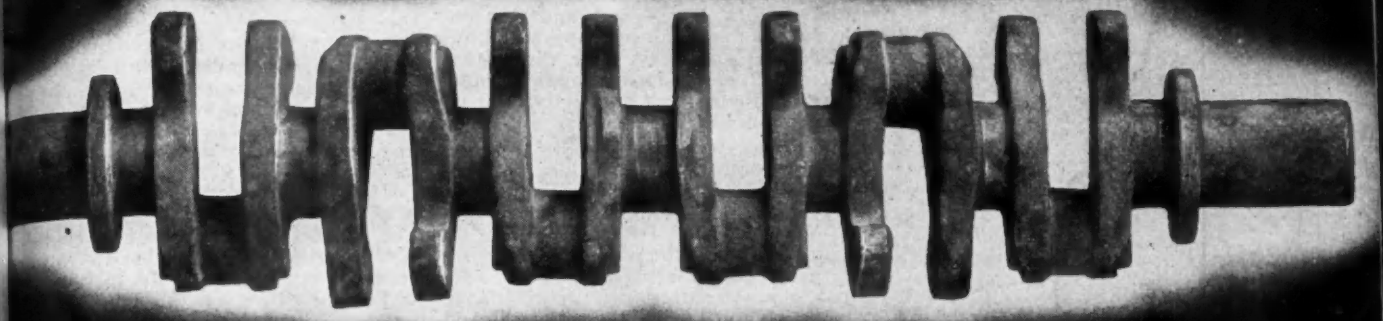

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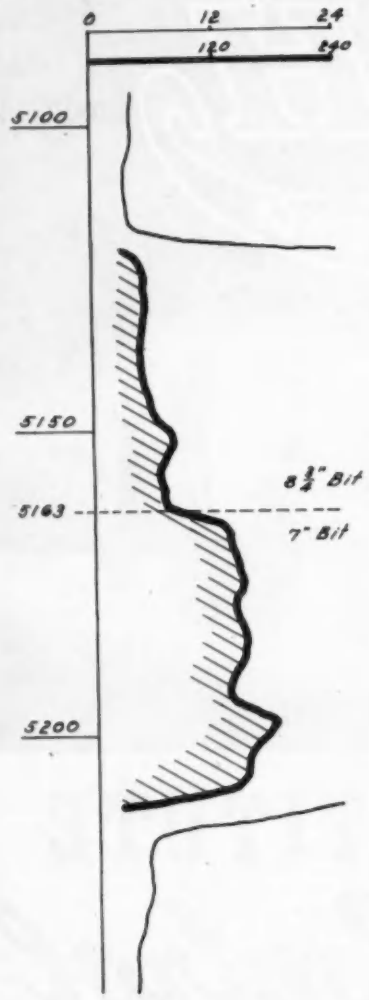


FIGURE 10-13
Two-electrode log of a highly resistant bed showing effect of hole size.

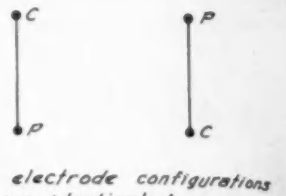
Figure 10-11 does not correspond to any characteristic spacing. The distinction between resistant and conductive beds can therefore be made by determining the abscissa X of the point of the curve where the break is situated. If X is different from the critical spacing, then the object bed is conductive (not necessarily water bearing however). If X is approximately equal to the critical spacing, it is usually difficult, and sometimes impossible, to deduce the electrical nature of the sand from the measurements; there is, however, a good probability that the bed is resistant.

To illustrate the foregoing discussion, there is shown on Figure 10-12 the result of a hypothetical experiment during which four different electrode spacings, ½, 2, 4, and 6 feet, were used on a bed 9 feet thick. The resulting resistance values obtained, namely, 8, 7.6, 0.5, and 0.7 ohm-m, have been plotted in terms of spacing length and have given the points A, B, D and E respectively. The graph shows that a considerable resistance drop occurs when the spacing increases from 2 to 4 feet and that the abscissa of the break X is approximately 4 feet, i.e., much less than the critical spacing (9 feet). The formation under survey is therefore a conductive bed invaded by the drilling mud.

The successful application of the foregoing method for distinguishing between resistant and conductive beds does not, in general, necessitate a large number of measurements. It can be seen on Figure 10-12 that the points A and E are not really necessary, because the desired characteristic drop in resistance can be obtained from the points B and D alone. In practice, 2 two-electrode curves are often sufficient to give complete information on a considerable number of permeable beds of the section traversed by a bore hole. It should not be forgotten, however, that other types of curves would give at least as good, and sometimes even better results.

Variations in Hole Diameter. As two-electrode curves are always made with relatively short spacings, the effect of the mud is always noticeable to some extent in very resistant formations. If the hole diameter is decreased in one section of the hole, the corresponding volume of mud is smaller, and the mud influence, of course, will be less. Referring to Figure 10-4, it can be seen that if bed B″ is logged with a spacing length $S_t = 0.15t$, the apparent resistivity will increase from 2.4 ρ_1 to 4.2 ρ_1 when the hole diameter decreases from 8½″ to 6″. (The preceding values are only approximate). This condition is illustrated on Figure 10-13 showing a two-electrode curve obtained in Oklahoma on a thick and highly resistant bed. The increase in resistance observed at 5163 is most likely due to the change in hole size at this particular depth.

If the formations logged have approximately the same resistance as the drilling fluid, there is almost perfect electrical homogeneity in the vicinity of the logging arrangement, and the changes in hole diameter are not noticeable on the log. This explains why the considerable variations in hole size observed in shales are, usually, not shown, on resistance curves.



These electrode configurations give identical logs

FIGURE 10-14
The two two-electrode arrangements.

Detail. Two-electrode curves average the measurement on a distance equal to the spacing CP, whereas three-electrode and four-electrode curves do so on a distance equal only to the pick-up span P_1P_2, regardless of the length of the spacing. Two-electrode logs, therefore, give considerably less detail than other types of logs obtained with the same spacing length. This limitation is another reason why the method is acceptable only when relatively short spacings are used.

The Reciprocity Principle. The curves given as examples in this article and in the preceding one have been obtained by assuming that the potential measuring electrode P is below the current electrode C. By virtue of the Reciprocity Principle, identical results would be obtained if P were placed above C. These two arrangements are shown on Figure 10-14. The selection of one of them in preference to the other is usually only a matter of convenience in the design of the logging equipment.

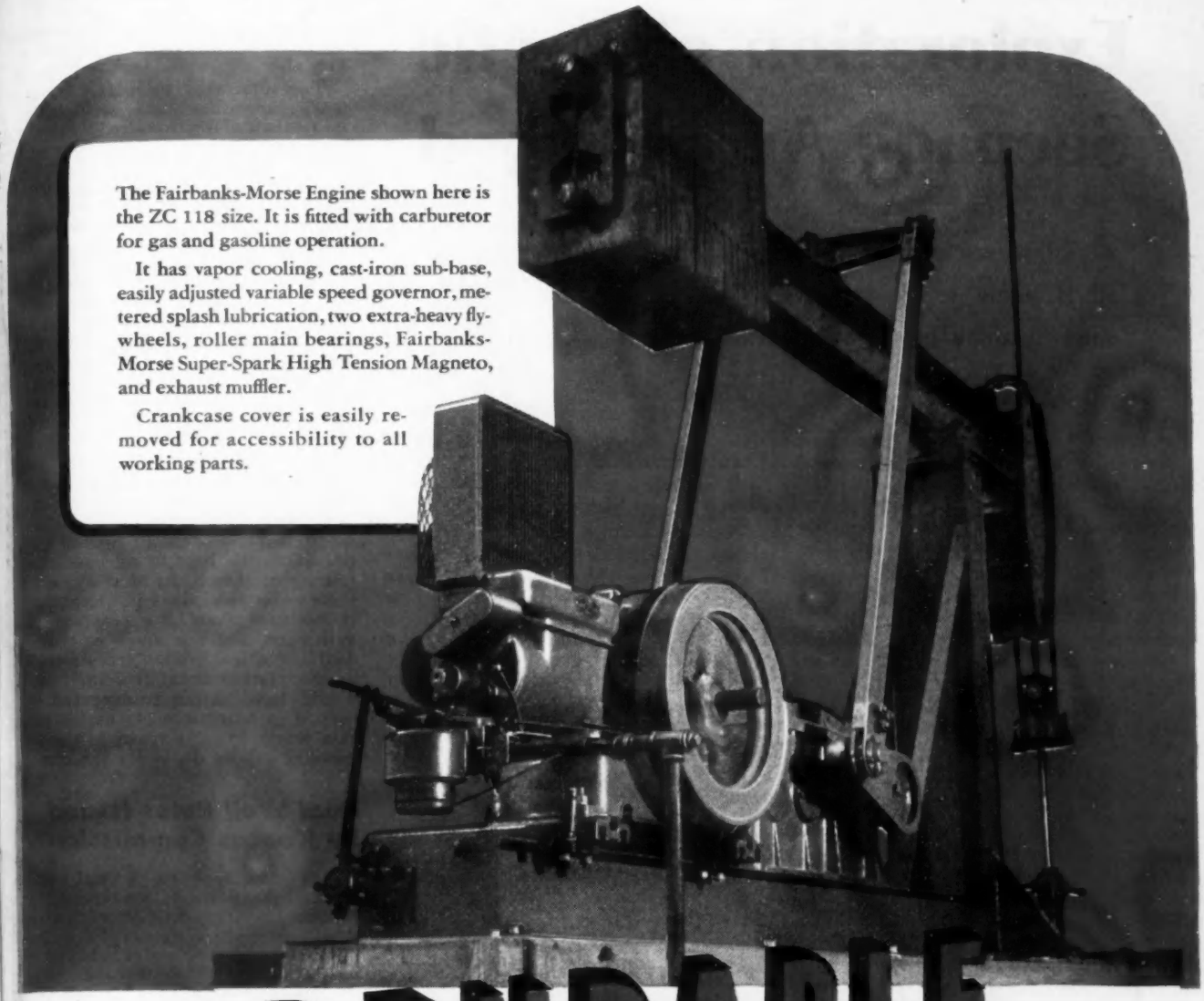
Summary of Interpretation

Because interpretation of two-electrode curves is sometimes difficult, it has been necessary to spend considerable time in this article to explain the influence of the various factors which affect a two-electrode resistance curve. The fundamental properties of these curves are summarized in Table 10-1 for convenience. The data contained in the table refers only to beds whch have a negligible amount of mud invasion.

TABLE 10-1
Fundamental Properties of Two-Electrode Curves (1)

	RESISTANT BEDS		CONDUCTIVE BEDS	
	Thick (2)	**Medium (3) and Thin (4)**	**Thick**	**Medium and Thin**
Approximate value of true resistivity	Given by maximum value read off the log, multiplied by correction factor	Cannot be determined accurately	Given by minimum value read off the log	Less than minimum value read off the log
Top boundary	Situated above apparent boundary at distance equal to ½CP	Cannot be determined accurately	Situated below apparent boundary at distance equal to ½CP	Situated below apparent boundary at distance equal to ½CP
Bottom boundary	Situated below apparent boundary at distance equal to ½CP	Cannot be determined accurately	Situated above apparent boundary at distance equal to ½CP	Situated above apparent boundary at distance equal to ½CP
Bed thickness	Add spacing length to apparent thickness	Cannot be determined accurately	Subtract spacing length from apparent thickness	Subtract spacing length from apparent thickness

(1) Applies only when electrode spacing CP is more than twice the hole diameter. Small degree of mud invasion assumed.
(2) Thick denotes thickness greater than 2CP.
(3) Medium denotes thickness comprised between CP and 2CP.
(4) Thin denotes thickness less than CP.



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Exploration of Arctic Seepage Areas Urged

Aerial survey of Alaskan section reveals places where oil is likely to be found, but much preliminary work must be done before production drilling is undertaken

MANY old seepage areas on the Alaskan Arctic slope, revealed by latest aerial surveys, should be explored immediately for future oil reserves in the opinion of Norman Ebbley, Jr., mining engineer, United States Bureau of Mines, writing in *Mining and Metallurgy*. The article tells of Bureau of Mines surveys in Naval Petroleum Reserve No. 4 which includes all the region of the Alaskan slope area as far east as the Canadian border.

According to Ebbley the field party sent into the area in the late summer of 1943, spent some three weeks, flew upward of 8000 miles, and surveyed an area of about 325 miles along the northern coast and inward about 100 miles. "Six separate localities containing evidences of petroleum were examined, and samples were collected from twelve separate seepages in these areas," he reports.

Three Geological Areas

Ebbley divides the Alaskan Arctic slope area into three geological provinces which merge gradually into each other. They all extend east and west parallel to the coast line on the north and the Brooks Range of mountains on the south. The most northern province is the coastal plain which is low-lying and traversed by many rivers which make foot travel practically impossible in the summertime. The middle area or province extends southward from the coastal plain to the Brooks Range of mountains. It is a plateau region with elevations ranging from a few feet on its northern border to some 3500 feet at the edge of the mountainous region in the south. The third province, the Brooks Range, is some 150 miles wide at its greatest width, and divides the Arctic slope from the interior or central Alaska. Its peaks range from 6000 to 9000 feet, but there are a number of low passes from north to south which would allow exit from the region to the south.

Oil in Six Areas

"Oil seepages," says Ebbley, "merely indicate the probability of petroleum somewhere in the vicinity. Such seepages appear when there is a natural escape of petroleum to the surface, either directly from an outcrop of oil-bearing sand or through a fault which acts as a channel from oil source-rock underground. When the oil reaches the surface it either flows away with the water in normal drainage, or dries. Consequently seep material usually has little resemblance to the oil in the formation from which it comes."

The Dease Inlet and Cape Simpson areas are in the coastal province near Point Barrow. "The deposit" at Dease Inlet, Ebbley writes, "consists of a heavy petroleum residue coming from a low mound, the residue also being found beneath the moss in several places around the mound. Several hundred sacks of pitch have been mined from a pit for fuel by the natives of the area." In the Cape Simpson area three seeps were investigated. The first one had an actual surface flow of viscous liquid about 800 feet long by 200 feet wide. The natives had mined this area considerably for pitch. The second seep flowed in a strip 150 feet wide some 600 feet to a little lake. A considerable area around the third seep was underlain by pitch.

At the Fish River seep, Ebbley reports, "The pitch seep is about 6 feet wide and 20 feet long and the pool is a solid, tarlike mass having no thin oil on the surface. The gummy residue in the deposit has trapped a number of birds and small rodents." The Umiat Mountain seep exhibited a slow and steady seep of oil with bubbles of gas.

The last two seepage points visited were at Barter's Island and Un-goon Point. The first is on tidewater, and the adjacent beaches were lined with oil froth for a mile and a half." Un-goon, which in Eskimo means "pitch," is also on the coast. The pitch found here was hard and difficult to dig, though some had been mined.

Future Prospects

Ebbley points out that only about one third of the area has been mapped geologically. "The available knowledge gives some information about the distribution of rocks with which petroleum is usually associated, but tells little about the actual occurrence of petroleum. For this reason considerable preliminary work is necessary before production drilling for oil can be undertaken," he says.

According to the article a pipe line could be constructed from the Cape Simpson area to Fairbanks, Alaska, a distance of 625 miles through Anaktuvuk Pass. This line would be only half as long as the line from Fort Norman in Canada to Fairbanks through Whitehorse. Ebbley recommends that exploration of the area be made immediately so as to determine the amount of oil available for future production.

The total area comprises about 100,000 square miles and is inhabited by not more than a few hundred people, Eskimos and half-breeds. Temperatures in winter average about 15 to 20 degrees Fahrenheit below zero from December to March, and in summer from May to September about 20 to 40 degrees Fahrenheit above zero. "Temperatures of 50 degrees below zero are not uncommon in the winter, and during July and August the thermometer may go down to 26 degrees. Precipitation in the area is low, seldom averaging more than 5 or 6 inches a year. Along the coast the snowfall is light but in the mountainous area it is somewhat heavier, usually accumulating to a depth of 3 to 4 feet during the winter."

Other annoying features of the climate are a constant high wind which ranges up to 100 miles an hour, and has a year-round average of 14 miles. Fog interferes considerably with air transportation, the best flying conditions obtaining in March, April, May, and June, with some good days in October. There is no fuel along the seacoast, except driftwood, and not much of that. Some coal and a few willow trees were found in the plateau area. But fuel and food would have to be transported in and cached in accessible places for exploration work. Point Barrow is the nearest gasoline supply depot for the area.

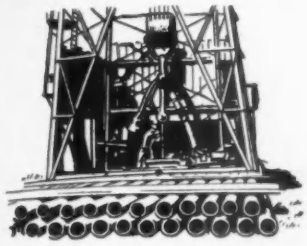
Dual Well Rules Issued By Kansas Commission

New rules applying to dual well completions have been announced by the Kansas Corporation Commission which also amended existing rules governing the taking of well potentials.

Dual completions will be permitted only by commission order and applications comprising original and three copies must be filed with that body as well as a plat showing well location and location of other producers on the lease with well depths and producing formations properly designated and land and lease ownership shown; the names of upper and lower limits of the formations involved in the dual completion; a well log, and a complete description of the proposed installation including size, weight, depth and condition of all casing and tubing, the size of all drilled holes, the amount of cement used and the estimated height of casing encased in cement, the location or intended location of casing perforations, the type of packer to be used and the depth at which it is to be set.

Dual completions shall be made and operated under commission supervision and if either zone in an intended dual completion is found to be non-productive, such zone shall be plugged and cemented. Dually-completed wells must be produced in such manner as to insure the complete segregation of all fluids from the two producing zones, and no such well shall produce from either zone in any one day more than 10 percent of the well's monthly allowable in that zone.

The commission has fixed an installation charge of $50 and an assessment of $20 per month for each dually-completed well to defray additional expense of supervision.



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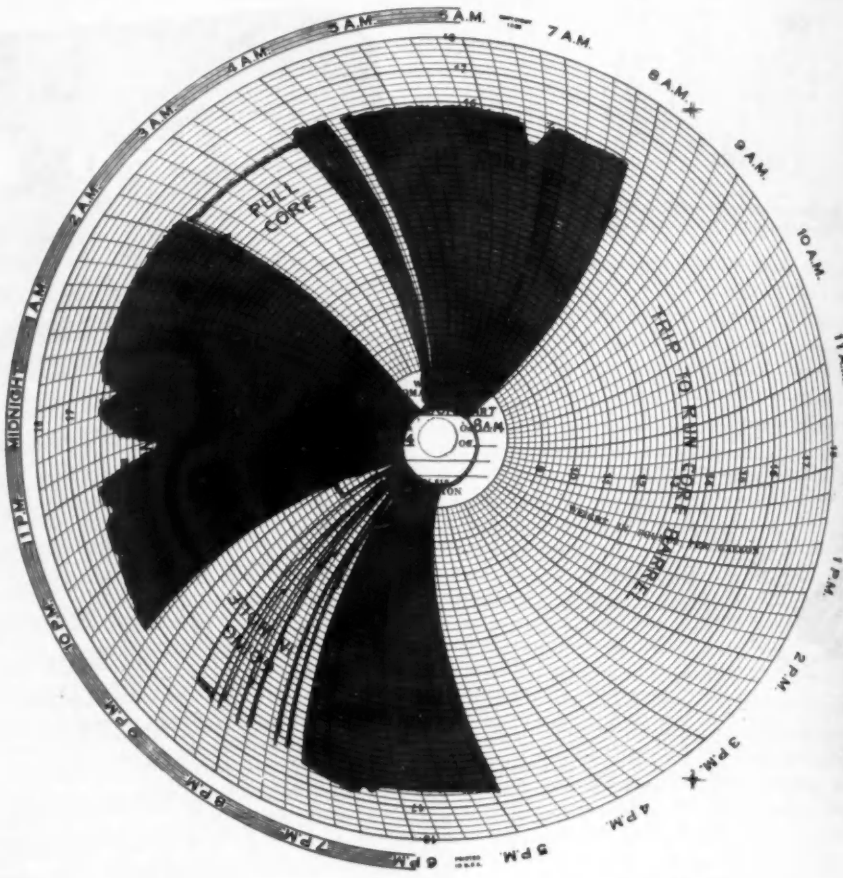
Overcoming Heaving Shale, Salt Water

Difficult conditions in Hitchcock deep test are met with control of mud

By JOE L. WARD, Engineer

DRILLING of one of the most interesting wells in the Gulf Coast area from an operational standpoint was completed recently on the flank of the Hitchcock field, Galveston County, Texas. The Maco Stewart 1, it was a venture of Glenn H. McCarthy and Phillips Petroleum Company. It was drilled by Harry L. Edwards Drilling Company under supervision of McCarthy to 12,588 feet despite heaving shale in the upper portion of the hole and extremely high-pressure salt water flows below 10,000 feet.



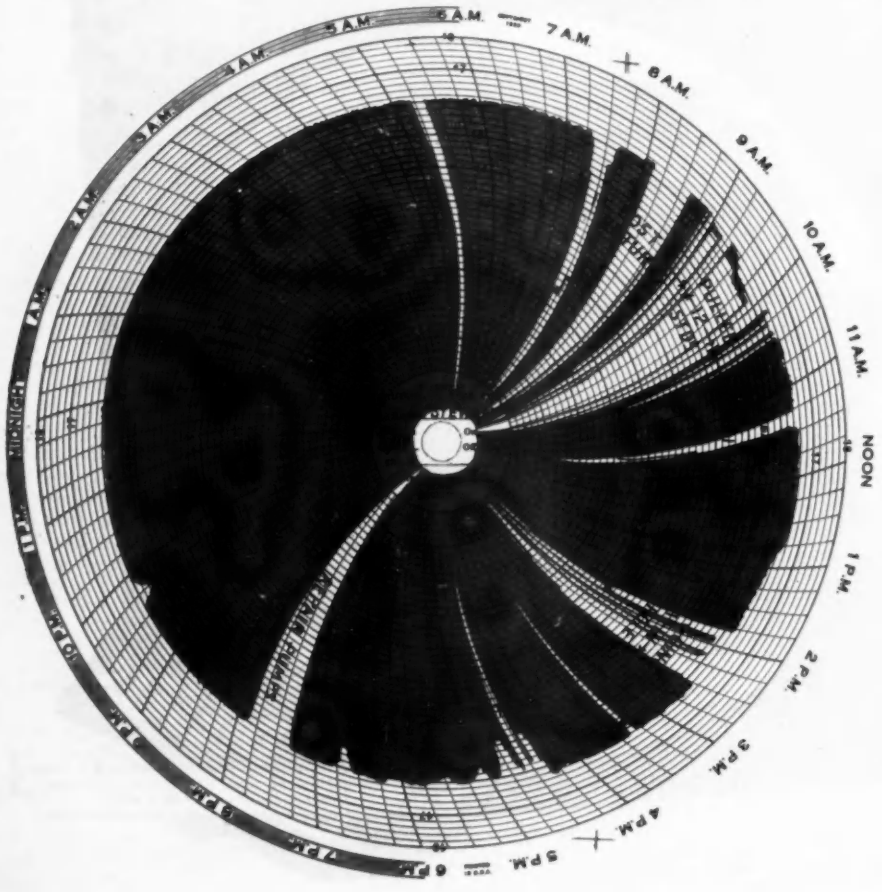


FIGURE 1

Representative mud charts (above and at left). Actual weights are 1 pound more than shown because the stylus pin was set back 1 pound below its normal zero position.

Another remarkable feature was the successful running of 4515 feet of 5½-inch O D liner to the bottom inside of 6⅝-inch open hole. More timid operators would not have made the attempt, after having once abandoned the operation because of difficult conditions. Both of these accomplishments were made possible only by maintaining the most rigid control over a water-free base mud at all times. The chief factor in analyzing the operations and maintaining the proper conditions was the use of a constantly recording mud weight indicator, and 24-hour-a-day supervision by one of the company's engineers.

Once Abandoned

The well was drilled early in 1943 to 7781 feet and abandoned because of the increasing difficulty of penetrating a heavy shale section, the top of which had been encountered several hundred feet up the hole.

In the original drilling operations, 16-inch conductor pipe was set at 163 feet and a 15-inch hole was drilled with 10-pound per gallon natural mud to 5227 feet, at which point 10¾-inch casing was set and cemented. From this point, drilling was carried on with a 9⅝-inch bit and 14-pound per gallon water base artificially weighted mud. As the depth increased, it became increasingly difficult to maintain drilling operations because of bentonitic shale. Though the shale would not actually heave in on top of

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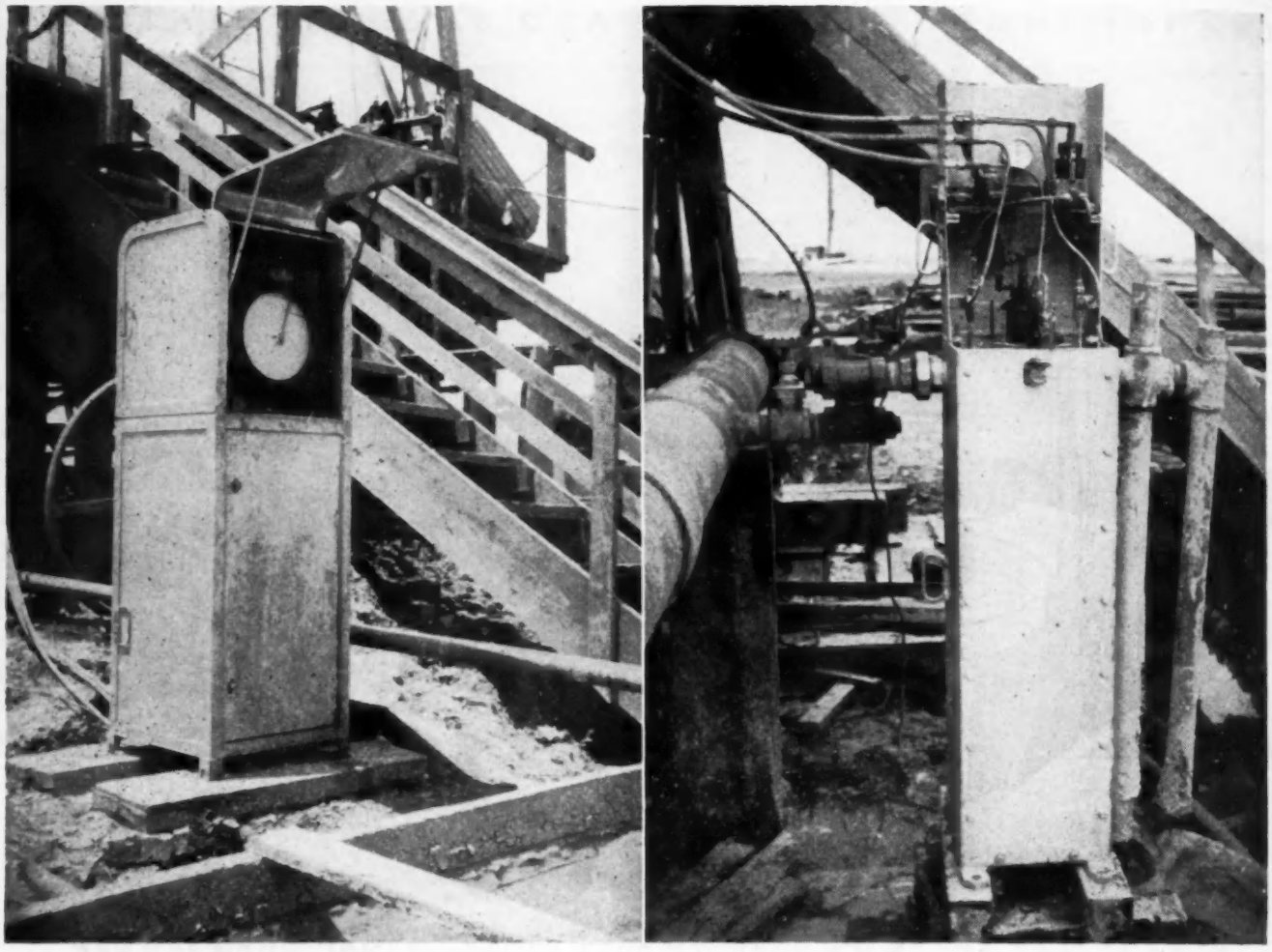


Automatic mud recording instrument used on Maco-Stewart 1. At left is view of recording face. At right is view of the mud weighing mechanism.

the bit while drill pipe was in the hole, the diameter of the hole would decrease more or less uniformly due to the swelling of the shale. When coming out of the hole it was frequently necessary to restore the walls of the hole to their original diameter by applying extreme pump pressures, and on at least one occasion it was necessary to pump the pipe part of the way out of the hole with 6000 pounds per square inch pressure pressure, using an oil well cementing truck. When out of the hole, shale would slough in or the hole would close up completely, and it would be necessary to re-drill portions of the well. Finally at 7700 feet, the prospect of discovering oil not appearing to be sufficiently good to warrant the additional expenditure to continue drilling, the well was turned over to Stewarts, who held mineral rights above 7500 feet, to compiete at a higher depth.

Completed As Oil Well

After the well was turned over to Stewarts the 10¾-inch casing was perforated below 5137 feet, and the well was squeezed and plugged back to that depth. It was then completed as an oil well through 5 feet of perforations at that depth and was produced as such for approximately six months. In completing the well screen and a 7-inch liner were packed off from the 10¾-inch casing, and 2⅜-inch tubing was then packed off with a production packer in the top of the 7-inch liner.

Well Deepened

Subsequent to the release of the well to Stewarts, Frio production was established more or less on strike with the well some several miles away, thus lending new hope to the prospects for deep production at Hitchcock. A decision was made to attempt to drill this well down to the prospective horizon, and McCarthy and Phillips concluded a deal with Stewarts to clean out its setting and resume drilling operations. The well was killed, screen and liner removed, and the producing perforations thoroughly squeezed off.

Drilling was conducted throughout with 3½-inch O D modified API I F drill pipe. A 9⅞-inch hole was dug from the bottom of the surface pipe to a depth of 8215 feet, at which point a protection string was set. Seven drag bits were used during the 35 days required to clean out the well and make this hole. Water-base mud was used, the desire of the operator having been to go as deep as possible before switching to sodium silicate mud. Below 8000 feet increasing difficulty was encountered with the heaving shale, and consequently at 8215 feet the decision was made to switch to sodium silicate, prior to which change a string of 7⅝-inch O D 29.70-pound flush jointed casing was set at 8189 feet. When the pipe reached bottom, circulation could not be broken as the formation took mud at 1600-pound pump pressure, and it was necessary to squeeze-cement the pipe in place.

After switching to sodium silicate, a 6⅝-inch hole was drilled to 12,588 feet, during which 32 drag bits were used. Fifty days elapsed from the time drilling was resumed after setting pipe at 8189 feet until a high-pressure salt water flow was encountered at approximately 10,400 feet, a total of 2211 feet. The next 600 feet of hole was made in 30 days. At 11,020 feet, an attempt was made to run an electric log, but at approximately 10,400 feet a total of 124 feet of logging tool and weights were lost. After six days of fruitless fishing, drilling was resumed and the junk was side-tracked with a 6⅝-inch rock bit—the only rock bit used in drilling the entire well. Twenty days were consumed in re-drilling from the point at which the logging tool was drilled by at 10,515 feet to the previously reached depth of 11,020 feet. No serious difficulty was subsequently encountered from the side-tracked tool, although occasionally small pieces of junk would fall to the bottom of the hole and had to be drilled up.

Slow Going

Two months were required to make the next 1000 feet and exactly 30 days elapsed in drilling the last 588 feet. A certain amount of wire line coring was done while drilling the latter two footages.

The open hole from 8189 to 12,580 feet cased off with a 5½-inch liner. After running the liner the drill pipe was re-

placed with a combination string of 2⅞-inch EUE and 2⅜-inch EUE N-80 tubing. The length of the tubing string required the use of N-80 grade pipe, provided a tapered string was not used. Because a full string of 2⅞-inch N-80 tubing could not be obtained, and also because the small clearance between the 2⅞-inch tubing couplings and the 5½-inch liner made it undesirable to circulate cement around the bottom of the tubing during squeeze jobs, 2400 feet of 2⅜-inch EUE tubing was run on the bottom of the combination string.

A series of fruitless drill-stem and production tests were made through successive sets of perforations in the liner from 12,550 feet back to 11,075 feet, which in most instances failed to recover any formation fluid whatsoever. Before abandoning the well the 7⅝-inch protection string was cut inside the surface pipe at 5215 feet and recovered. After six months of drilling inside of this pipe with 3½-inch drill pipe, most of the time without rubber protectors, and an additional month of testing, etc., with 2⅞-inch tubing, this pipe was found to be in remarkably good condition. Nine months were spent in drilling and attempted completion operations after the well was re-entered the second time.

After the protection string was pulled, the well was squeezed and plugged back inside the 10¾-inch casing and turned back to Stewarts, who re-completed it for an oil well in the same manner as before. Before re-completing, however, the 10¾-inch casing above the old perforations was tested with 1200 pounds per square inch for 15 minutes, no pressure loss, to insure that it had not been injured as a result of drilling through it.

Mud Conditioning

From the time drilling operations were begun the second time until the 7⅝-inch protection string was set at 8189 feet, drilling was maintained with water base artificial mud, and the heaving shale which brought about the original abandonment of the well was successfully drilled therewith by maintaining sufficient mud weight and holding the water loss to a minimum by carefully controlling the mixture and excluding all free water. This latter was accomplished by covering the entire surface mud system with a waterproof covering and using extreme care in washing the pipe while coming out of the hole and cleaning up the rig floor to prevent the contamination of the mud. After the original completion was cleaned out and actual drilling was begun, a mud weight of 11 pounds per gallon was carried until a depth of 7100 feet was reached, when the weight was built up to 11.6 pounds per gallon. By the time the bottom of the original hole was reached at 7771 feet the weight had been further increased to 12.8 pounds per gallon, which was maintained by adding additional weighting material at intervals until the protection string was set and the switch made to sodium silicate.

During this time considerable chemical treatment was necessary to maintain a workable viscosity, which varied from 80 seconds to 150 seconds (1500 cc in and 1000 out). With all of these precautions difficulty was encountered, as in the original operation, with the hole closing in on the pipe, and it was occasionally necessary to pump part of the way out of the hole when making a trip. An attempt to run an electric log at 7817 feet failed when the logging tool failed to get within 100 feet of bottom because of the hole closing up. When the decision was made to set the protection string and switch to sodium silicate, the water-base mud had apparently reached the limit of its possibilities.

Problem Solved

After the switch was made to sodium silicate no more difficulty with tight hole was experienced. Because there is no fresh water present in a mixture of sodium silicate mud, there is no swelling or disintegration of the bentonitic shales that are penetrated, and the character of the hole is easily maintained. In addition, due to the much lower suspended solid content than that of water base mud, extremely high weights are obtainable with low viscosity and gel rate. The quality of the mud is not affected by contamination with salt water, which makes it exceptionally valuable for drilling through salt water flows, and as it is also unaffected by lime, various salts, etc., it is unnecessary to chemically treat it. However, because the bit cuttings do not disintegrate in the mud, the rate of drilling is considerably less than that obtainable with water-base mud.

The mud consisted of sodium silicate, which is in effect liquid glass, and ordinary weighting materials. Sodium silicate is obtainable in either liquid form or as a dry powder, latter being mixed with salt water or fresh water and common table salt. Mud weights in excess of 19 pounds per gallon are obtainable with workable viscosities, although in this well the maximum weight was limited to approximately 18 pounds per gallon.

The original batch of silicate mud was mixed at 13.8 pounds per gallon and had a viscosity of 45. Liquid silicate was used for the initial mixing; the weight of the liquid silicate as delivered is 12.7 pounds per gallon and sufficient common weighting material was added to bring it up to the desired weight. By the time the high-pressure salt water flow was penetrated at approximately 10,400 feet (estimated formation pressure of approximately 9300 pounds per square inch) the weight had been increased to 17 pounds per gallon, after which it was maintained in the range from 16.8 to 17.2. A constant check was kept on the mud weight with a continuously recording mud weight tester, which at all times gave a complete picture of what was transpiring in the bottom of the hole by indicating salt water flow, lost circulation, etc. The viscosity varied from 58 seconds to 70 seconds, and the mud temperature at the surface averaged about 144 degrees. The bottom-hole temperature at the total depth was approximately 340 degrees.

Fluid Loss

The mud as originally mixed is supposed to have a zero water loss. Although with this mud there is no actual water loss, there is a fluid loss which constitutes the liquid phase of the mud, being a solution of sodium silicate and salt (sodium chloride) in water. The extent of this fluid loss as determined in a standard filter press varied from 20 cc to 35 cc in 30 minutes with 100 pounds per square inch applied pressure. The filtering of this fluid back into the bentonitic formations did no injury to the hole, and cuttings placed in a jar of the filtrate did not disintegrate during a period of six months. Because of this fluid loss it was necessary to constantly replenish the liquid phase, which was done by adding a small stream of liquid silicate at the approximate rate of a barrel an hour, along with which were added from five to eight barrels of water per day to maintain the proper silicate concentration.

The liquid phase was maintained with a salt concentration of from 6 to 12 percent and a silicate concentration of from 40 to 50 percent. The optimum silicate concentration ranged from 45 to 48 percent and above this range the viscosity began to increase and the gel strength to decrease. The salt and silicate concentrations were checked once every 24 hours along with the fluid loss. The viscosity and the gel strength were tested at two-hour intervals, and, as previously mentioned, a record of the mud weight was continuously made with an automatic weighing instrument.

Close Balance Maintained

After the high pressure salt water flow was encountered an extremely close balance had to be maintained between mud weight, mud viscosity, pump pressure, and strokes per minute of the pump, the latter being, of course, a criterion of mud volume through the bit. An improper combination of these conditions resulted in either a salt water flow into the hole or mud loss into the formation. On several occasions when the latter occured, a loss of from 100 to 150 barrels of mud would be subsequently recovered as the pressure of the mud column was reduced, and the mud would come back into the well in its original condition, relatively uncut by either water or gas, indicating that the over-burden had been lifted and the mud pumped out between the bedding planes in the formation. The friction between the 6⅝-inch open hole and also the 7⅝-inch casing and the 3½-inch drill pipe was such that with a pump pressure of 1700 pounds per square inch and a mud weight if 17.2 pounds per gallon, if the viscosity exceeded 63 seconds the formation would take mud. By decreasing the mud weight to 16.8 pounds per gallon the viscosity could be increased to 70 seconds before this occurred. The pit level was measured every 15 minutes to maintain a check on mud loss into formation.

Increasing Mud Weight

The static weight of the mud column itself without the applied circulating pressure at the bit (pump pressure less friction loss in drill pipe) was insufficient to counterbalance the pressure in the formation from which the salt water flow emanated, and consequently before coming out of the hole it was necessary to increase the mud weight. About 25 minutes before starting out of the hole 250 sacks of weighting material was quickly added to the mud. In so doing the mud leaving the hopper would weigh from 20 to 21 pounds per gallon, but after mixing with the mud in the pit the mud entering the pump suction weighed about 19 pounds per gallon. The overbalanced condition between the mud in the drill pipe and the mud in the annulus permitted the pulling of dry pipe (contact of mud with skin and eyes is very painful) and prevented the swabbing in of salt water. The pipe was pulled very slowly through open hole to prevent the latter. During the pulling

of the first 50 stands the hole would be filled up through the drill pipe and thereafter through the annulus. During tihs process the pit was calibrated and the amount of mud required to fill up was checked against the pipe displacement to insure that no water was coming into the hole.

On the way back into the hole the pipe was stopped opposite the bottom of the protection string and the heavy mud in the well was lightened up with salt, silicate, and water until the proper mixture according to the formula was obtained. Had continuous drilling been maintained for as long as four days prior to making the trip, it would also be necessary at this point to mix up from 50 to 100 barrels of fresh mud to control the viscosity. Again about half way between the bottom of the protection string and the bottom of the hole the pipe would be stopped and the mud circulated around one time. When bottom was reached and before drilling was resumed it would be necessary to discard the mud in the bottom of the hole as it reached the surface because it would be badly cut by salt water contamination. This was necessary also to keep from overflowing the pits because of the addition of the fresh mud.

From 5 to 8 days drilling time usually elapsed between trips to change the bit, and a round trip required from 24 to 48 hours. The longest period of time out of the hole was 5 days out plus 2 days trip time, and no difficulty was experienced in getting back to bottom.

Friction Losses

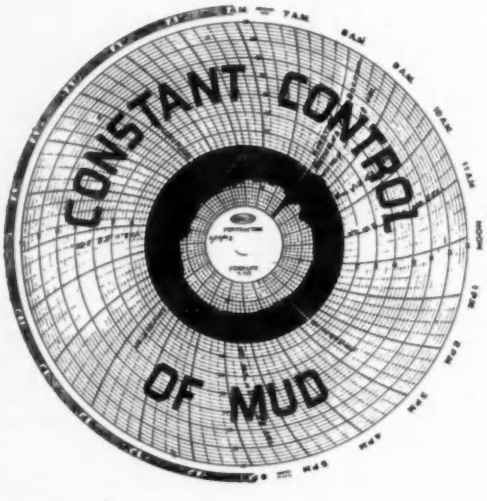
The rate of penetration of the formation was limited by the relatively small fluid velocity obtainable because of the extremely high friction losses in the 3½-inch drill pipe and the restricted annulus. The rig was equipped with two 20-inch pumps with 15½-inch steam ends which were compounded from the time the change-over to silicate mud was made. By the time 10,000 feet was reached the 7-inch liners with which these pumps were fitted were insufficient to give the required volume at the circulation pressure of 1225 pounds per square inch thus obtainable. Shortly thereafter the pump liner size was reduced to 6 inches, which increased the circulating pressure to 1400 pounds per square inch. This was gradually increased as drilling progressed to 1700 pounds per square inch at the conclusion of the job. The minimum speed of the pump necessary to drill was 17 strokes per minute, and the pump speed varied between this and 20 depending on the viscosity of the mud. The drilling of the last 2500 feet was limited to a rate of from 2 to 3 feet per hour, depending on the condition of the mud, the character of the formation being for the most part more or less the same. The formation could have been drilled much faster, but at rates exceeding 3 feet per hour the rate of mud circulation was insufficient to remove the cuttings from the hole, which would accumulate above the bit and eventually stop circulation. Once an hour the pipe was worked up and down the length of the kelly several times to clean the cuttings from immediately above the bit. The rotary speed was limited to a maximum of 60 strokes per minute which was entirely adequate for the desired rate of drilling.

It is the opinion of the operator's superintendent, under whose direct supervision the well was drilled, that the hole could not have been successfully drilled without the use of sodium silicate mud and that the proper mud conditions could not have been maintained within the necessarily narrow range without use of a continuously recording mud weight indicator. The automatic weighing instrument gave remarkably trouble-free and highly accurate service. This instrument operates as follows:

A portion of the mud from the return line is diverted through the chamber of the instrument, in which is measured the difference in pressure required to introduce a flow of gas or air into a column of the mud at two different points in the column. As the weight of the mud changes, the differential pressure thus required varies accordingly and is translated into mud weight in pounds per gallon and recorded on a 24-hour chart so calibrated. The mud chamber is automatically flushed out and refilled and a reading of the weight recorded once every 45 seconds.

Permanent Record

The chart thus obtained provides a continuous record of the mud weight, and thus a permanent record of the drilling operations can be obtained by recording on the chart the pertinent information relating to the indicated con-



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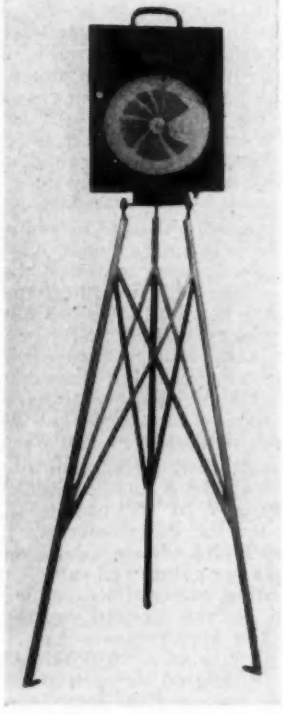
In the Gulf Coast Area, the "Mud-O-Graf" has contributed a great deal to the success of many wells by enabling them to reach their objective. The presence of high-pressure gas sands, salt water flows and heaving shale makes it necessary to maintain the most rigid control over the mud.

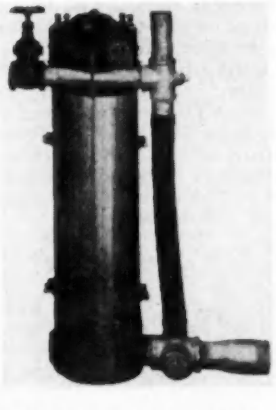
The "Mud-O-Graf" makes it possible for the engineer or mud-man to know at all times the true condition of all of the mud in the system. With this information automatically recorded, and constantly before him, he can intelligently maintain a uniform weight and viscosity.

The slightest variations in weight and viscosity are recorded, as they occur, on a 24 hour chart. As a result, weighting materials and chemicals are used more efficiently and economically, and the danger of blowouts are minimized.

The "Mud-O-Graf" chart further indicates drilling speed and the time required for all other drilling operations.



Recording Unit



Weighing and Viscosity Unit

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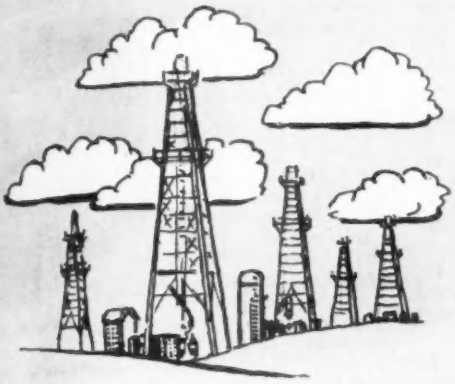
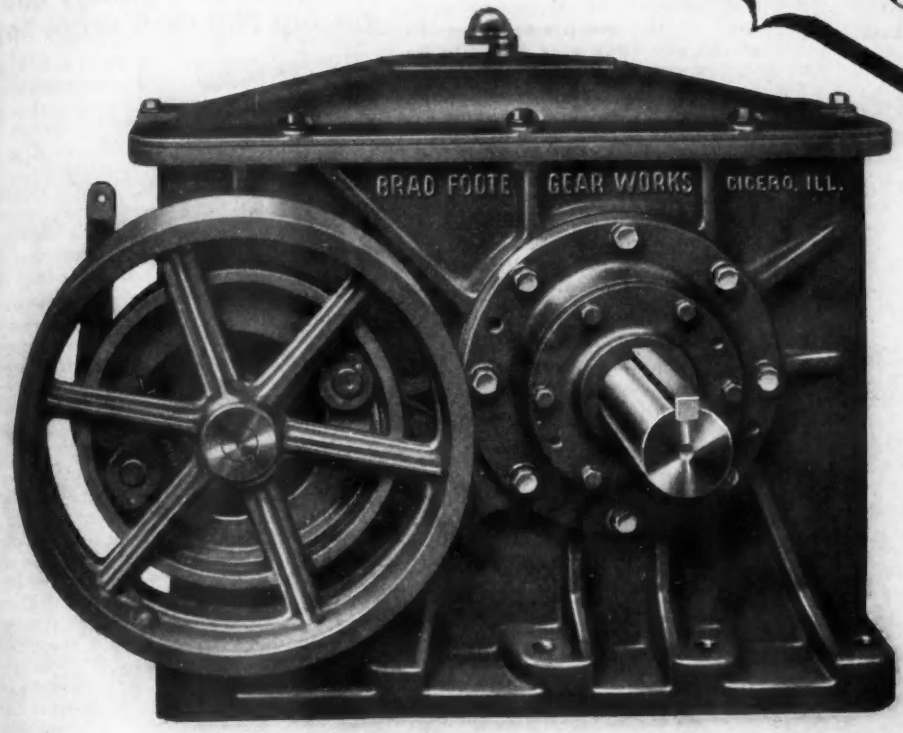


LITTLE GIANT of the Oil Field



This Brad Foote Product—for certain kinds of oil field service, cannot be beat. It is low in price and fills a demand for units where a central power or heavier units are not required. Made in 5 H.P.—10 H.P.—15 H.P.—20 H.P.—with peak torque rating from 24,750 to 69,500 inch pounds. Helical gearing made of alloy steel with hardened teeth, (550-600 Brinell), mounted on Timken Tapered Roller Bearings—shafts of chrome nickel molybdenum steel heat treated forgings—housings 30% semi-steel. This speed reducer is noted for its long service records and does the job exceedingly well.

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ditions. From this chart such conditions are readily apparent as shutdown time due to repairs or making a trip, frequency of filling up the hole while making a trip, lost circulation, and light streaks in the mud, which latter, in addition to providing the information necessary to maintain mud control is also useful in identifying prospective producing formations and salt water flows. Representative charts illustrating the above are shown in Figure 1.

One of the chief difficulties experienced as the result of using such heavy mud was the trouble in obtaining a satisfactory electric log. An attempt was made to log the well with an instrument run on a rubber-covered line, but due to the low specific gravity of the line, the instrument with a number of attached weights could not be put down past 8200 feet. The addition of more weights resulted in the fishing and sidetracking job previously mentioned. It was then necessary to use an instrument which could be run on a bare steel line, which was successfully accomplished. Needless to say, the high salt concentration of the sodium silicate mud reversed the potential curve and dampened the resistivity curve to the point where it was extremely hard to differentiate between the various formations.

After the hole had been completely cased off it was desired to make a radioactive survey of the well, but the available instruments would not operate at temperatures in excess of 270 degrees, and in view of the indicated high bottom hole temperature the idea was abandoned.

The fact that the following 5½-inch liner setting could be made in a 6¾-inch open hole traversing highly bentonitic shale formations at a total depth of 12,588 feet is truly remarkable: 17 pound, N-80, threaded and coupled—1859 feet at 8065-9924. 20-pound, N-80, flush joint—2656 feet at 9924-12,580. The liner was run on the drill pipe and no guide or floating equipment was used, although the lower part of the bottom joint was orange-peeled and tapered. The pipe was run very slowly, 24 hours having been required for the trip in. To prevent flow-back of the mud through the casing a plug containing a ⅛-inch opening to release the air was made up in the top of each joint of casing and each stand of drill pipe, where it remained while that joint or stand was being lowered in the hole. When the pipe reached botom, attempts to break circulation were unsuccessful, and the liner was suspended eight feet off bottom with a liner hanger in the 7⅝-inch casing and sealed off with a liner packer equipped with hold-down slips. A retainer bridge plug was then set in the bottom of the liner and the pipe squeeze cemented through perforations just above the plug. The successful running of this liner can be largely attributed to the low deviation of the hole, which never exceeded 2½ degrees from vertical.

Nine Months Job

The elapsed time betwen re-entering the well subsequent to its original completion and the return of the well to the lessor was exactly nine months, during which time $89,023 was spent on mud materials. Although the well failed to make a producer, the operators are entitled to the satisfaction of having accomplished a real achievement in Gulf Coast drilling annals.

Arkansas Gas Laws

• CONTINUED FROM PAGE 32

partment for use in the fulfillment of this Act; directing the Oil and Gas Commission to make investigation and report to the next regular session of the Legislature."

Section 1 includes these definitions:

"Water Drive" is any process whereby energy for the recovery of oil is derived principally from the movement of water in the formation. The water may be either native or introduced artificially into the formation.

"Gas Drive" is the process wherein energy for the recovery of oil is derived from gas under pressure in the formation. There may be an injected gas drive; or a gas-cap drive, which is the displacement of oil by the growth of expansion of a gas zone in an oil reservoir; or a solution-gas drive; which is the displacement of oil by the expansion of the gas dissolved in it, depending upon the source of the compressed gas. In this manner, gas drive may apply to either primary or secondary recovery.

"Water Injection" is the introduction of water into a sub-surface reservoir.

"Gas Injection" is the introduction of any gas into a sub-surface reservoir.

"Water Flooding" is the introduction of water into an oil-bearing formation for the purpose of increasing the oil recovery, i. e., a secondary recovery operation employing water injection.

"Repressuring" is the introduction of fluid, either gas or liquid, into a producing formation for the purpose of increasing the reservoir pressure.

"Pressure Maintenance" is a primary or secondary recovery operation so conducted as to afford some degree of control over reservoir-pressure decline. This is preferably accomplished by gas injection in the early life of a pool.

"Recycling" is a continuous re-injection of produced gas.

"Cycling" is an operation in which condensate-bearing gas is displaced from a gas zone in injection of dry gas.

"Gas Condensate" shall mean the liquid produced by the condensation of a vapor or gas either after it leaves the reservoir or while still in the reservoir. Condensate is often called Distillate, Drips, White Oil, etc.

Section 2. The Oil and Gas Commission of the State of Arkansas is hereby authorized and directed to make such investigations and research as in the judgment of the Commission is appropriate to ascertain the advisability of the employment of a secondary recovery method or methods in any pool within the State of Arkansas containing oil and gas, and to this end are authorized to employ the personnel which in its judgment is necessary for the performance of such work.

Section 4. If the persons owning and operating any oil pool or portion thereof enter into an agreement among themselves for the employment of any secondary recovery method or methods for the production of oil from said pool or portion thereof, and the Oil and Gas Commission finds that operating the pool or portion thereof in accordance with said agreement, will result in the prevention of waste, the performance of such agreement by said persons shall not be a violation of any Statute of this State relating to trusts, monopolies, or contracts or combinations in restraint of trade.

Joins Bel-Air

John J. O'Keefe, Jr., has been appointed assistant general manager of Bel-Air Oil Company, Los Angeles. In the oil business since 1922, he has been associated with various oil companies. Prior to his appointment by Bel-Air he was chief division petroleum engineer with the Rio Grande Oil Company and Richfield Oil Corporation. He was graduated from the State College of Mines and Metallurgy, El Paso, in 1921.

John J. O'Keefe, Jr.

Imaginative Geology and Daring Needed, Cram Says

Ira H. Cram, president of the American Association of Petroleum Geologists, and assistant chief geologist of The Pure Oil Company, speaking before the New York Academy of Science, October 2, ridiculed the idea that most of the prospective structural traps in the United States have been tested, and said petroleum geologists are too willing to depend upon experience and accepted theories in the search for more oil fields.

"Since there is no positive discovery formula," he said, "the opinions of the majority do not necessarily represent the truth, and the drill has repeatedly demonstrated the folly of mentally condemning an area on the basis of past experience and unimaginative appraisal of possibilities."

Many geologists condemned the well-known Fitts structure because it was "too close to the Ordovician outcrop in the mountains nearby," but imaginative geological reasoning brought about discovery of this 100 million-barrel field, which "proves that only the drill can condemn any area or any structure where sedimentary rocks are involved in the stratigraphy," he said.

"Imaginative geology, plus much more daring than geologists in general have heretofore practised, are required if we find the new oil that we will need, and they must be applied to the task even in the use of the most expensive geophysical tools and the interpretation of geophysical data."

Dr. Cram asserted that proper interpretation of geophysical data absolutely requires geological judgment. Oil geologists, he said, should fit themselves so that they can understand and interpret all earth data as geological findings and be responsible for those interpretations.

Discussing stratigraphic trap accumulations, Dr. Cram said the geologist should not allow himself to depend upon random drilling to locate them, but should develop more ideas that can be turned into stratigraphic trap discoveries. Stratigraphic traps, he said, are not so much hidden lenses or pinchouts, as sedimentary facies resulting from structural control in the vicinity. Their location and interpretation, he stated, are therefore a straight geological problem, and it is up to the geologist to figure them out and come up with the right answers, using his imagination to supply the missing links in the meager data available to him.

Specify Lebanon CIRCLE L 21 for Weldments...

CORROSION-RESISTANT QUALITIES UNALTERED BY WELDING HEAT

MORE and more industries are taking advantage of the economies offered by weldments—composite units produced by the welding together of several castings. However, the size and shape of many of these structures prohibit post-welding heat treatment—a practice normally used to restore corrosion-resistant qualities lost through application of heat during welding.

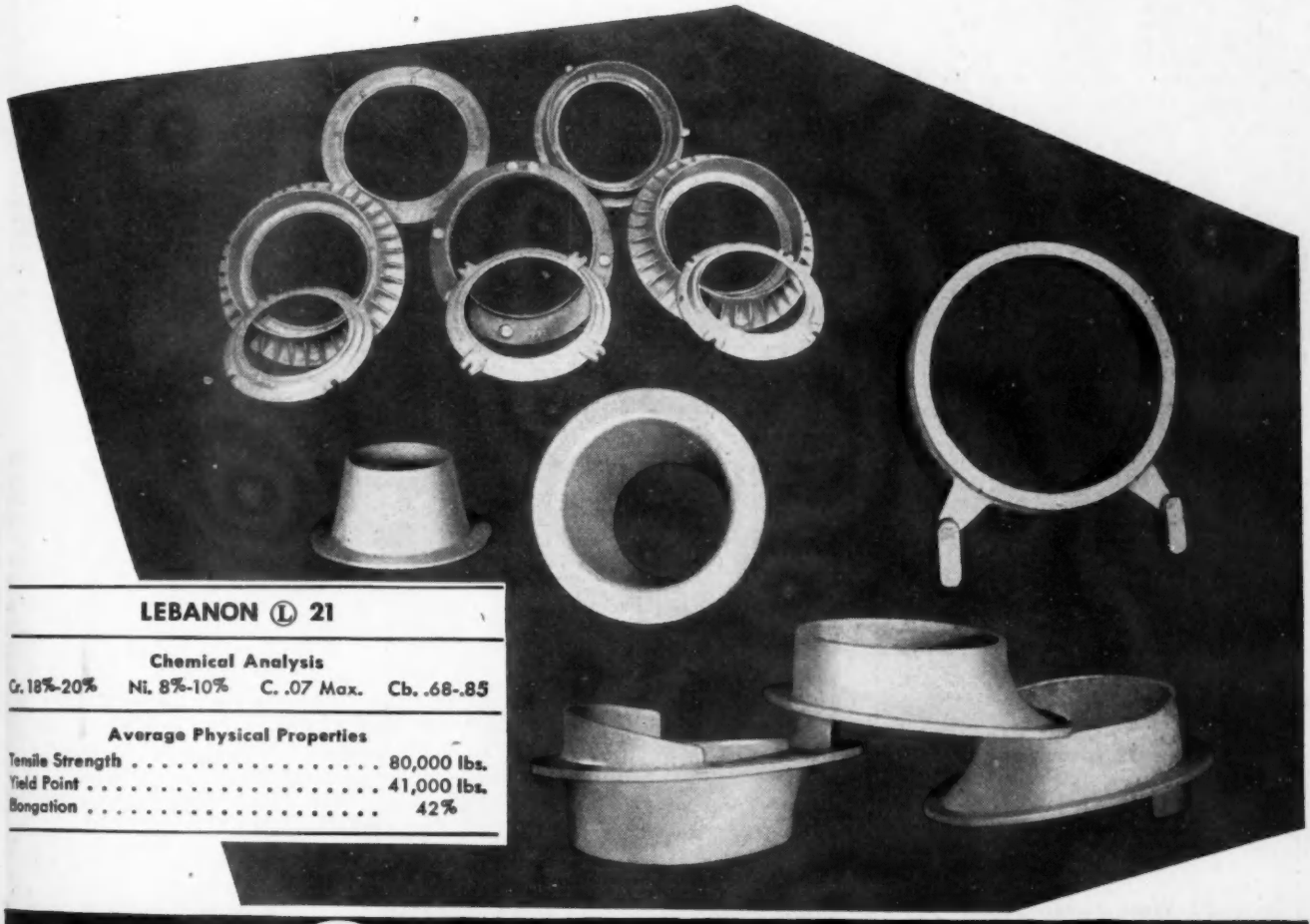
The best solution of this problem is the use of a casting alloy that loses none of its corrosion resistance during the welding process. Lebanon has developed such an alloy in Ⓛ 21. Through the addition of columbium, this 18% chrome and 8% nickel steel is stabilized against the action of welding heat.

In austenitic 18 and 8 alloys, the remarkable affinity of columbium for carbon forms a stable columbium carbide constituent. This constituent protects against carbide precipitation and inhibits inter-granular corrosion. As a result, when heat is applied to Lebanon Ⓛ 21 during welding, the corrosion resistant qualities of this steel are retained intact. The need for post-welding heat treatment is eliminated.

Induction melting of Lebanon Ⓛ 21 permits close analytical control. It meets U. S. Navy Specification 46S27 for resistance to salt water as well as the corrosion requirements of a great variety of applications in the oil producing and refining industry.

LEBANON STEEL FOUNDRY **LEBANON, PA.**

ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD



LEBANON Ⓛ 21

Chemical Analysis

Cr. 18%-20% Ni. 8%-10% C. .07 Max. Cb. .68-.85

Average Physical Properties

Tensile Strength	80,000 lbs.
Yield Point	41,000 lbs.
Elongation	42%

LEBANON CIRCLE L *Stainless and Special Alloy* **STEEL CASTINGS**

OPERATING HINTS *For Pipeliners*

Special Truck Gadgets Speed Repair Work

Pipe line field work is being speeded in that department of one oil company by the addition of several small time-saving features attached to the rear of small field trucks. Instead of leaving cables or hose out in the weather between jobs, they are now coiled up carefully inside upright, covered sections of "big-inch" casing bracketed to the rear of the body. The tight-fitting cover, while easily removed, has sufficient overhang to keep out dust, rain or fog.

EXPEDITING FIELD JOBS

A feature which was designed to overcome partly much time ordinarily lost due to lack of experienced help in the repair gangs consists of a stack of seven hexagonal nuts of decreasing size welded together and the group then welded in a horizontal position to the rear of the truck frame. Taking in all the most commonly encountered field sizes, the nuts permit the welder or mechanic at the job to tell his helper what size of end- or box-wrench he desires out of the tool box and the man will be able to test for proper size without guesswork before returning to the job site.

$5.00 is paid for each illustrated acceptable contribution. Mail to The Editor, THE OIL WEEKLY, P. O. Box 2608, Houston 1, Texas

Other items include a shelf on which can be carried the heavy field jack instead of having it take up badly-needed space in the regular tool box; also a light, handy rack built to accommodate a number of pipe welding rollers, the latter being shop-made also, and having adjustable axles that permit their use with a wide range of pipe sizes.

Above: Truck equipped with wrench-sizing device which speeds overhaul jobs and protects crew from accident. Below: Spring-actuated cover on rod container insures proper weather protection.

Spring-Closed Box Protects Welding Rods

Speeding the welder's work on field jobs are the handy, tamper-proof rod containers devised by the pipeline welder of one company. Differing from the usually-employed short sections of pipe set vertically in the truck bed which are used to hold the supply of rod, these containers are rectangular, sturdily built boxes which have a lid that will automatically hold itself either full open or tightly shut. The larger of the boxes on this particular truck-mounted unit contains three divided compartments, each holding a different size of rod. Another smaller but taller box contains additional types of rod, but all have the common feature of having a pin spotted on the side of both cover and lower side of the box between which a light coil spring is stretched. The box hinge and pegs are so arranged that when full open,

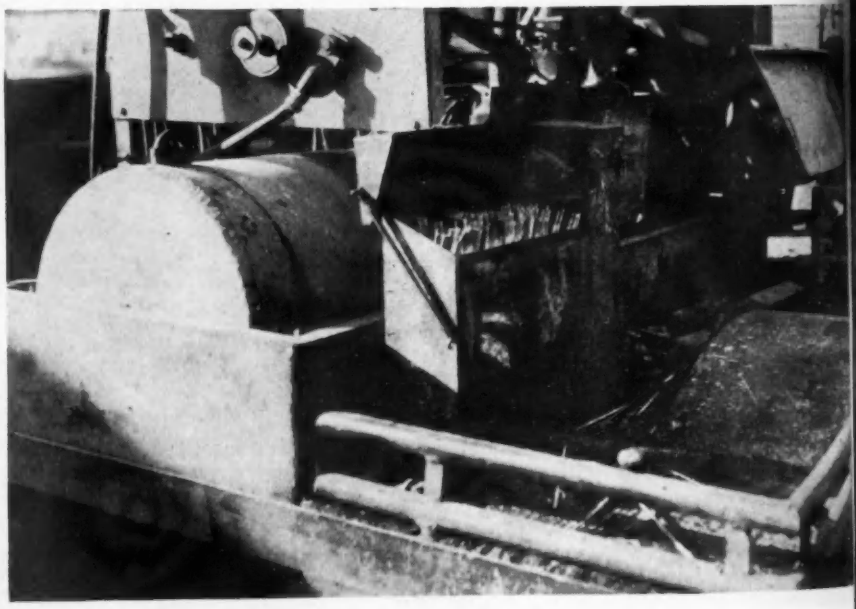
WELDING CONTROL

C. S. FOREMAN COMPANY

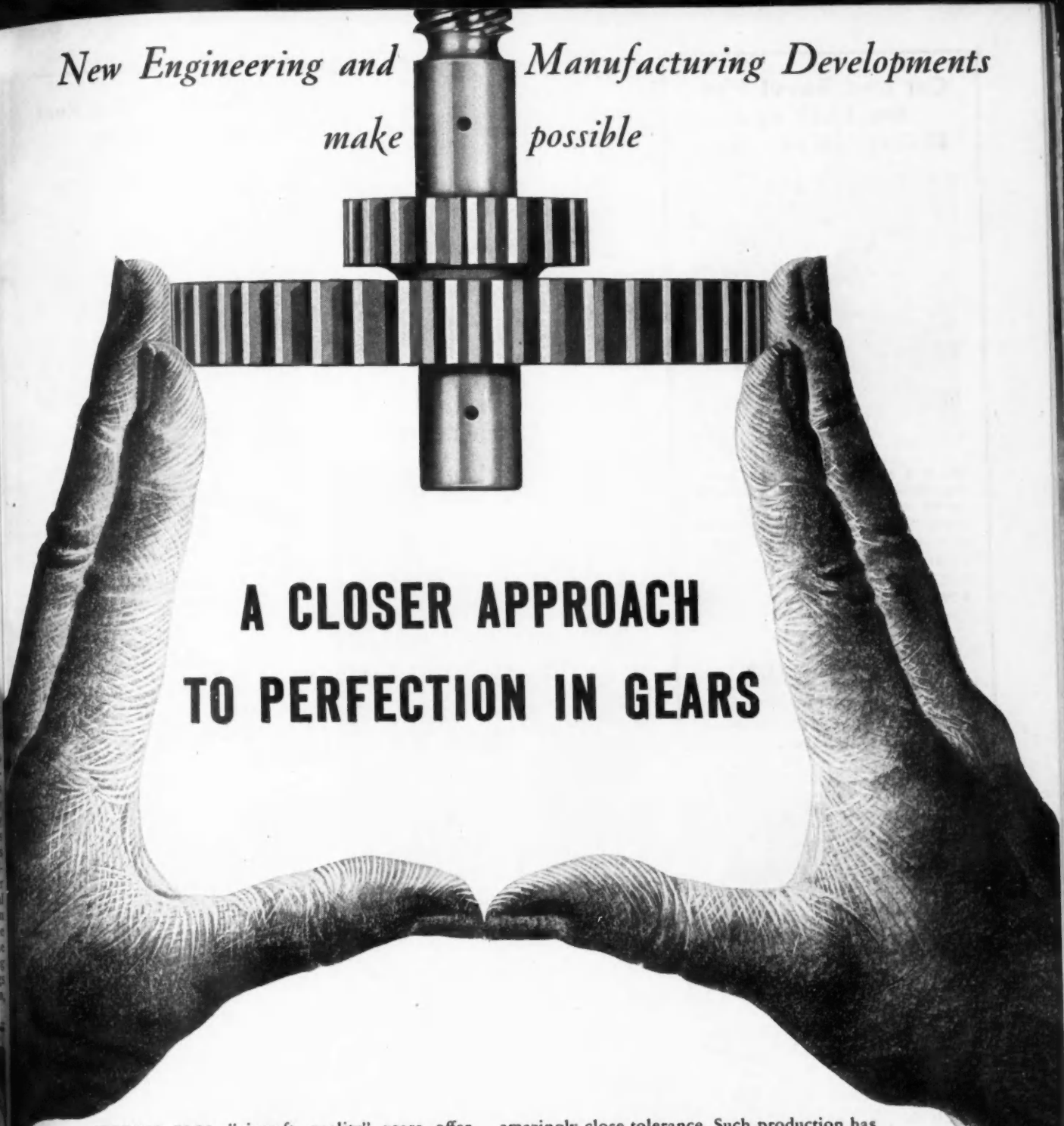
General Contractors

PIPE LINES

20 West Ninth Street
Kansas City, Missouri



New Engineering and Manufacturing Developments make possible



A CLOSER APPROACH TO PERFECTION IN GEARS

FOOTE BROS. "aircraft quality" gears offer the major advantages of greater mechanical efficiency, lighter weight, longer life, greater compactness and quieter operation.

Before war demanded the production of high precision gears in tremendous quantities, it was possible to attain such extreme precision only by laboratory methods—mass production was deemed impossible.

Today at the plants of Foote Bros., these "aircraft quality" gears in quantities sufficient to power the world's greatest air armada are rolling off production lines—each dimension held to an amazingly close tolerance. Such production has meant a new approach to gear manufacturing techniques.

If the machines or equipment you plan to produce when the war is won requires gears, these new developments will offer you new advantages in the economical transmission of power.

FOOTE BROS. GEAR AND MACHINE CORPORATION
5225 South Western Boulevard • Chicago 9, Illinois

A booklet containing information and engineering data on "aircraft quality" gears is now being prepared. If you would like to have a copy as soon as it is ready, ask for one.

FOOTE BROS.

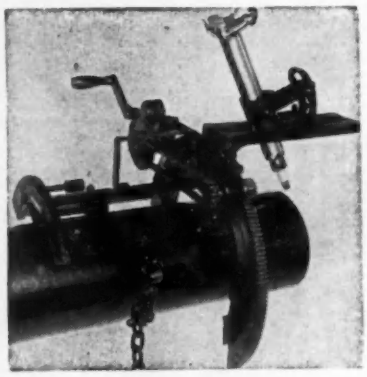
Better Power Transmission Through Better Gears

FOOTE BROS. GEAR AND MACHINE CORPORATION
OW-10 5225 S. Western Blvd., Chicago 9, Illinois

Please send me a copy of the Engineering Bulletin on "Aircraft Quality" Gears as soon as it is available.

Name.....*Position*.....
Company.....
Address.....
City.....*State*.....

Cut and Bevel Pipe the FAST and ECONOMICAL way



The H & M Pipe Cutting and Beveling Machine cuts any size pipe with speed, economy and accuracy.

SPEED: Complete cut and bevel can be made on 12 inch pipe in about 2 minutes.

ECONOMY: Save approximately one-half labor and gas costs.

PORTABILITY: Can easily be carried from one pipe section to another.

Write for Literature

The H & M
Pipe Beveling Machine Co.
20 East 25th. - - Tulsa, Oklahoma

Trenching it's BUCKEYES

They dig trench in any soil with the kind of speed that is helping our nation out of a crisis. The tough, compact Model 11, smallest of the Buckeye Pipeliners, for small crude lines and gasoline and natural gas lines. Model 12 for medium lines; Models 32 and 48 for main lines.

BUCKEYE TRACTION DITCHER COMPANY
Findlay, Ohio
Built by Buckeye
TRENCHERS, SHOVELS, CRANES
BACKFILLERS TRACTOR EQUIPMENT

the cover is held in that position by spring action; and similarly, when closed, the cover will not fly open even under the heavy bouncing sustained on rough lease roads.

Having ample overlap all the way around the side, the cover shelters the coated rod from damage by rain, fog, and being damaged by being struck with tools or other foreign objects. A long hasp welded to the front of the box permits locking it when the unit is unattended, and this feature, plus the saving from loss through softening of coating material by moisture has many times repaid the slight extra cost of this improved rod carrier.

Steel Guard Protects Drinking Water Cooler

Steel shield encloses can and fends off equipment while on the move, also cooling unit.

Having cool drinking water at all times for construction and roustabout crews, is an important item. As is frequently the case, drinking water cans of the cooler type will serve cool water only until the afternoon when continued exposure to the sun causes the water to become warm. One company has solved the problem by providing a heavy steel cover for the can and at the same time providing a strong and theft-proof rack for holding the can.

WATER SUPPLY

This rack is made with steel legs as shown in the illustration (the water can has been removed to show construction details). Only the top half of the water can is covered in order to permit air to circulate around the cooler while at the same time keeping the sun's hot rays away. The entire cover is easily removed when placing the can on the elevated base. Three bolts hold the cover in place and at the same time hold the can from spilling.

When a flat top is provided on the shielding unit, it must be equipped with air circulation vents, or it will serve to retain hot air and thus defeat much of the insulating value of the device.

Thermometer Line Reel Protects Tank Top

Reel keeps oil-soaked chain or line over tank, and protects gauger's record from oil smears.

In most shipping tanks a thermometer is used to take the temperature of the crude oil before sale. Where the oil is heavy, the chain holding the thermometer will become inconvenient to handle unless some sort of device is provided to wind up the line when a reading is being taken. A convenient and easily constructed reel was made by using a short length of sucker rod bent into the shape of a crank while supporting the reel was a ¼-inch by 2-inch steel strap frame. The frame was mounted on the hand rail on the edge of the open top tank.

GAUGING DEVICE

When taking a reading, the gauger must record the gauge taken and with this simple device he can keep his hands free of crude oil and thus aid in preserving legible records.

PIPE LINE SUPPLIES AND EQUIPMENT

CLAMPS • BRUSHES • HOOKS
CANVAS RUGS

Trackson Pipe Layers
International Tractors
Insley Backhoes

Clarence L. Boyd Co.
C. M. (FAT) MULLINS
Phone 8191 L.D. 745
Tulsa, Okla.

SIMPLICITY IS THE FIRST REQUISITE OF SAFETY

Look for the hazards that aren't there!

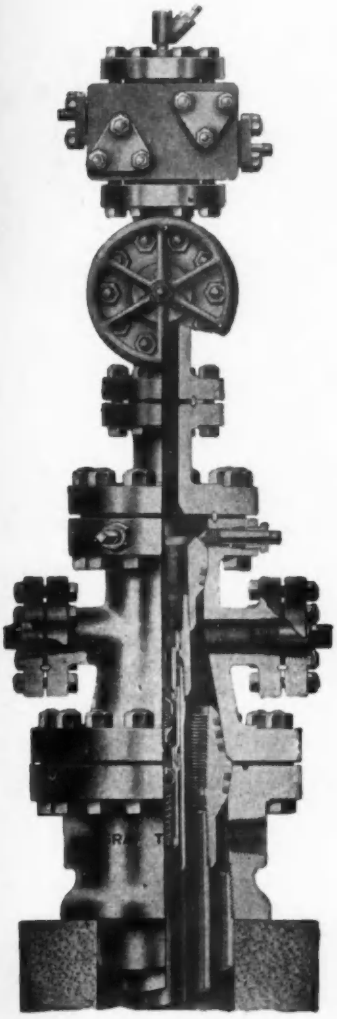


Fig. 11A
Complete Well Head Assembly equipped with Canfield Bushing Type Tubing Hanger.

In Well Control, you eliminate hazards when you pick out a System of Well Control which provides for removal of each part as quickly as its operating function has been completed.

Many control mechanisms, such as **blowout preventers, valves, strippers,** etc., must depend for seals upon the use of short-lived, low strength packing materials and greases. These highly flowable materials stand up beautifully under factory tests when new, but disintegrate quickly in the field when called upon to operate over the life of the well.

In Gray Systems of Well Control, parts that have been removed after having performed their operating functions are NOT potential sources of trouble. The hazards disappear;—simplification results. It's economical, too, for these parts are used again and again on succeeding wells, instead of on the only well to which they have ever been attached.

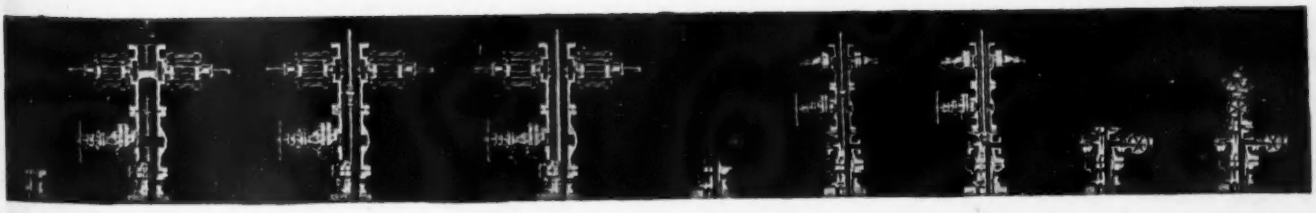
BUT the main advantage lies in the fact that, at the time of removing a part, you have likewise removed a hazard.

The whole is greater than any of its parts. Look for the hazards that aren't there.

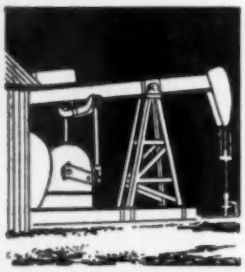
THE WHOLE IS GREATER THAN ANY OF ITS PARTS

GRAY
TOOL COMPANY
HOUSTON

West Coast Distributor: WAGNER-MOREHOUSE, INC., Los Angeles. *Export Representative:* GUY E. DANIELS, 30 Rockefeller Plaza, New York City



Casing Head Attached | Drilling | Running Casing | Casing Landed | Drilling Control Equipment Removed | Drilling-in and Running Tubing | Tubing Landed | Control Equipment Removed | Manifold Attached



OPERATING HINTS *For Production Men*

Tool Storage Rack Speeds Job Completion

Roustabout crews can make their selection of tools for the days work with little loss of time by using the handy rack illustrated. This general purpose rack was made from odd sizes of angle steel taken from the scrap box. The uprights and main framework were made of 2 x 2 x ¼-inch angles and the cross bars were 1 x 1 x ⅛-inch angles. The cross bars were spaced about 6 inches apart. The overall dimensions were roughly 4 feet wide by 5 feet long by 5 feet high. Many brooms, picks, hoes and other implements may be conveniently held until needed and then are readily available when a certain job requires the use of a certain tool.

HAND TOOL STORAGE

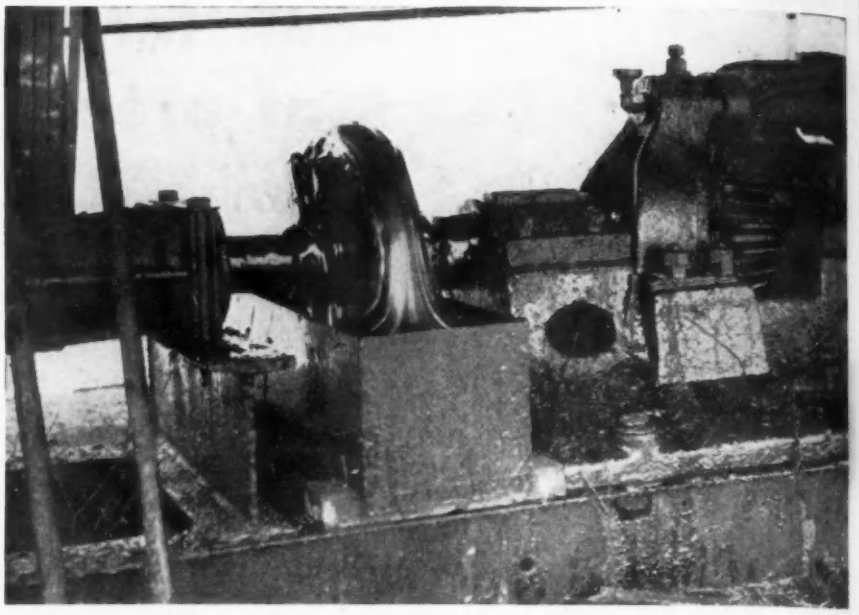
This unit permits quick check of available tools and simplifies outfitting of field gangs.

Oil Bath Immersion Extends Joint Life

The task of keeping the moving parts of a jack plant well lubricated has been solved by one operator by using a dip type lubricator. In this particular plant, a universal joint is used to connect the gear box to the central power. This is the "peg in hole" type and has direct metal to metal wearing surfaces. Therefore some positive type of lubrication is necessary to prevent excessive wear.

EQUIPMENT LUBRICATION

A simply constructed trough, 12 inches wide by 12 inches deep by 3 feet long made of 12-gauge black sheet steel is placed under the universal joint and leveled so that about one-third of the diameter of the joint is below the top of the trough. Heavy lubricating oil is placed in the trough. The oil need only be changed when excessive sludge is formed. In this plant the crude oil produced is filtered and then used in the trough.



This metal-to-metal type universal joint on power shaft is thoroughly coated and lubricated by bath in which unit revolves at a speed which is low enough to forestall splatter.

Folding Step Unit Improves Truck Usage

An ingenious folding step for ease in loading oil field trucks has been devised by one oil field contractor. Much of the fatigue normally caused truck drivers and swampers can be eliminated by providing these steps from the truck body to the ground.

SAFETY TRUCK STEP

The folding steps were made from discarded stairway material taken from lease oil tanks. The steps illustrated consist of two treads of the perforated type 9 inches wide by 12 inches long. These two steps are spaced about 12 inches apart, thus making the truck bed available in three equal steps. The side plates are made from used 12-gauge steel and are 10 inches wide by 22 inches long. The two treads are welded to the side plates and the side plates are fastened to the truck body by means of two parallel bars on each side. These bars are made from ⅜ x 2-inch stock. The parallel bars are bolted to a piece of angle steel which in turn is fastened to the bottom of the truck bed. When not in use the entire stairway can be swung back under the truck bed and held in place by a small latch. By lifting the latch the stairway will fall into position by gravity. Another latch holds the steps in the use position. Besides saving the operator considerable time and effort in loading and unloading the truck, these folding steps add greatly to safety first by preventing serious injury from falls.

Folding truck step clears all road obstructions, yet insures footing when loading equipment.

IN SUSPENSION

SOLIDS INTO PEARLS!

What does an oyster do with tiny solid particles that find their way into its shell? Of course! It coats them with a secretion that hardens into precious pearl—keeping the oyster safe from irritation and possible serious harm!

Your high-speed diesels and heavy-duty gasoline engines have much the same problem of what to do with tiny solid particles in their insides. *You can solve it for them with Conoco HD oil!* Remarkably high detergency enables Conoco HD oil to charge those particles electrically, holding each one safely *in suspension—not* ganging up with other particles to form excessive muck in the pan . . . *not* readily clogging up the screen . . . *not* heavily gumming up ring grooves.

At the same time, you can tackle other sources of trouble by using Conoco HD oil. For in addition to high detergency, this oil possesses outstanding ability to inhibit corrosion and to retard oxidation as well! These invaluable characteristics are the result of carefully compounding several advanced Conoco HD synthetics in a base of specially selected heat-resistant stock—solvent-refined. Precise balance of components is achieved in Conoco HD oil. That's why you'll find Conoco HD oil "right in there pitching" when it comes to oil economy, low maintenance and rarely interrupted operation. For quick delivery of Conoco HD, phone the nearest office of Continental Oil Co.

CONOCO HEAVY-DUTY OIL

HD

CONOCO

GOOD well control equipment, proven well completion methods, and seasoned operators to assist you. If you're looking for this combination ... we have it.

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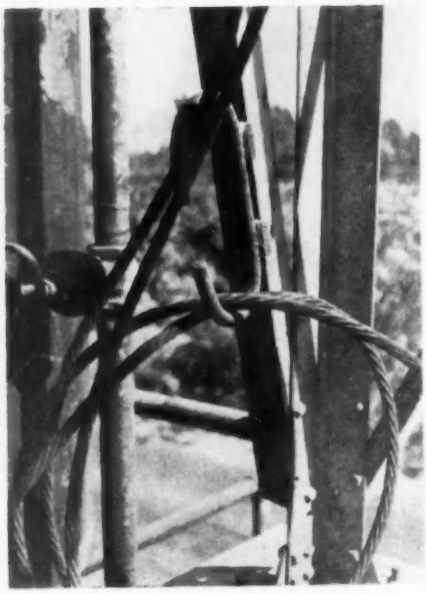
C-Type Loop Stores Spare Wire Line Coil



Welded to derrick strut, this open link supports and restrains loop of spare dead line on rig.

A practical and time-saving means of tying back the tubing block lines which are left hanging in the derrick between pulling jobs is shown in the accompanying illustration. It consists of welding a nearly-closed loop of sucker rod material in a vertical position to one of the derrick supports, preferably in a little-used corner. The open gap in the steel loop measures some 6 inches across and affords ample space through which to thrust the loosely hung loops of cable, yet it is close enough to prevent the strands from flipping out again unless deliberately pulled out.

WIRE LINE PROTECTION

$5.00 is paid for each illustrated acceptable contribution. Mail to The Editor, THE OIL WEEKLY, P. O. Box 2608, Houston 1, Texas

Considering the slight expense of this simple tie-back, it probably is one of the least costly that could be built in the company welding shop, yet results obtained are as satisfactory as those obtained from some more elaborate installations.

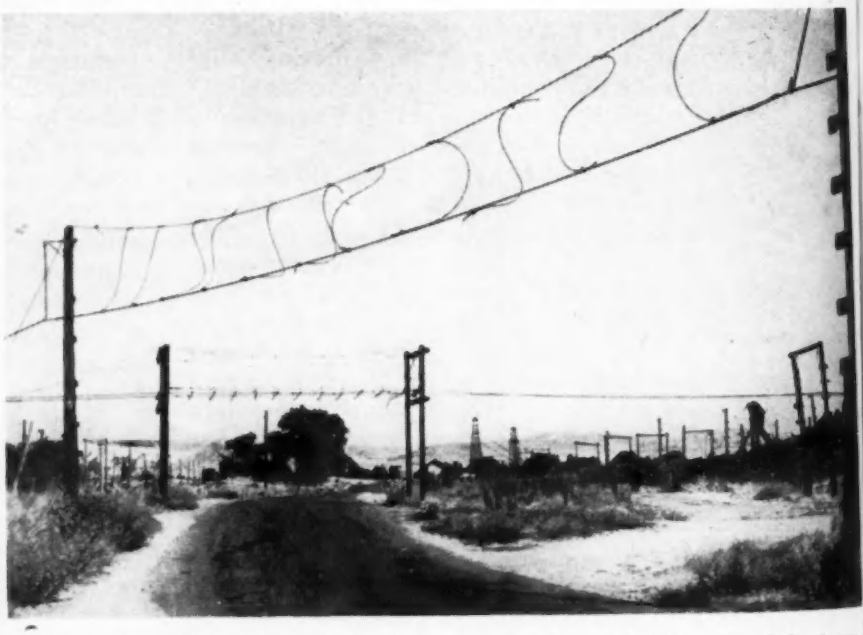
Supplemental Supports Guard Overhead Lines

In oil fields where jacklines must cross public roads, the danger of broken cables falling or hanging on roadways is serious. The two safety methods illustrated show simple yet positive means of preventing broken cable ends from becoming a menace.

JACK LINE SAFEGUARDS

One system for single lines only is nothing more than an additional non-working cable firmly supported about four feet above the jackline. At intervals of three feet, cable loops are hung from the top cable and arranged so that they hang loosely yet are firmly tied to the lower jackline cable.

The other system is for safeguarding several parallel jacklines. It consists of two non-working cables placed at a slightly wider distance apart than the farthest apart jacklines. The usual cables are hung vertically from the top rigid cables to slightly below the parallel jacklines. The ends of these vertical cables are fastened to short lengths of sucker rods extending horizontally underneath the jacklines. If any jackline cable should snap while in service, there is then no chance for the loose ends to fall upon the roadway or in any way endanger vehicles or persons passing below the lines.



Overhead cables, with flexible ties to jack lines, insure against dropping to roadway below in case of breakage, yet do not hamper transmission of required pull between units.

Gasoline and Residual Fuel Added to Storage Despite Lower Refinery Runs

Both crude production and refinery runs declined materially in the week ended October 7 from the all-time highs of the previous week, and the result was lower production of gasoline and residual fuel oil, although output of distillate fuel oil was somewhat increased. Nevertheless, there were additions to stocks of gasoline and residual as well as distillate fuel.

U. S. crude production of 4,691,000 barrels daily in the week of October 7 represented a decline of 71,000 daily from the previous week but was 301,000 a day or 6.9 percent higher than output in the corresponding week last year. Crude stocks stood at 222,393,000 barrels on September 30, or 12,250,000 barrels (5.2 percent) lower than a year previously.

Crude runs to stills averaged 4,506,000 barrels daily in the October 7 week, down 269,000 from the week before but 391,000 daily or 9.5 percent above runs in the like week last year.

Gasoline production remained above 2,000,000 barrels daily in spite of curtailment, having averaged 2,036,000 a day, down 35,000 from the previous week but 282,000 a day or 16 percent higher than in the like week a year ago. Stocks of finished and unfinished gasoline accumulated at the rate of 75,000 barrels daily, having risen to 78,554,000 barrels on October 7. That was 9,540,000 barrels or 13.8 percent more than the 69,014,000 barrels held October 9 last year.

Gas oil and distillate fuel oil production averaged 672,000 barrels daily, up 12,000 a day from the week before but 10,000 daily or 1.5 percent lower than in the corresponding week last year. Stocks were increased at the rate of 107,000 barrels daily, having climbed to 46,078,000 barrels, a level 5,565,000 barrels or 13.7 percent higher than that of 40,513,00 reported for October 9, 1943.

Residual fuel oil production of 1,239,000 barrels a day was 88,000 less than in the previous week but 123,000 a day or 11 percent more than in the like week last year. Stocks were increased at the rate of 60,000 barrels daily to 64,644,000 barrels, which amount was within 4,239,000 barrels or 3.3 percent of the 66,883,000 barrels held October 9 last year.

☆

COLONEL AUBREY W. SCHOFIELD has returned to the Gulf Oil Corporation, Houston, to resume his duties as assistant superintendent of production for the Houston district after active military service since November, 1940.

Accumulation of Aviation Gasoline to Start Soon

With the United Nations' production of 100-octane aviation gasoline due this month for the first time to exceed requirements for combat and training purposes, the accumulation of seriously needed working stocks and initiation of volume production of a greatly improved super aviation fuel will be made possible, it was disclosed last week by PAW.

At the start of the war, Administrator Ickes said, only 23 refineries in the United Nations were making finished aviation gasoline, and since 1941 the industry has been building enough new 100-octane refineries to permit the large-scale operations contemplated by the military and now being carried out.

"Now we have more than 65 refineries producing finished 100-octane gasoline," Ickes said. "We are rapidly approaching our target, and in October we will make enough to meet all needs —at home and abroad—commence inventory accumulation, and at the same time improve quality."

Defense Supplies Paying Extra Cost for Pacific Oil

Defense Supplies Corporation has taken over the additonal cost of moving crude oil from West Texas to Los Angeles by rail and, acting on a recommendation from PAW, will recompense shippers of approximately 20,000 barrels a day required on the West Coast to meet the increased military requirements of operations in the Pacific war theatre.

Trends of Operations and Changes in Stocks

Figures on crude stocks are from Bureau of Mines weekly reports; all others from American Petroleum Institute weekly reports, which are estimates on Bureau of Mines basis.

(All figures in thousands of barrels—add 000)

HIGHS AND LOWS OF RECENT YEARS

ITEM	Crude Oil Prod. Barrels Daily	Crude Oil Prod. Week Ended	Runs to Stills Barrels Daily	Runs to Stills Week Ended	Crude Stocks Barrels	Crude Stocks Week Ended	Gasoline Stocks Barrels	Gasoline Stocks Week Ended	Gasoil and Distillate Stocks Barrels	Gasoil and Distillate Stocks Week Ended	Residual Fuel Oil Stocks Barrels	Residual Fuel Oil Stocks Week Ended
Highs:												
1941	[1]4,337	11-22	4,120	10-18	266,187	3-29	99,727	3-29	[1]54,983	11-15	102,448	1- 4
1942	4,337	2- 7	3,961	1- 3	263,208	3-28	[1]109,281	3-14	49,861	11-14	95,857	1- 3
1943	4,436	11-13	4,331	12- 4	245,752	5-29	94,159	3-20	46,187	11-27	72,881	1- 2
1944	[1]4,762	9-30	[1]4,775	9-30	240,992	1- 1	89,162	4- 1	46,078	10- 7	64,644	10- 7
Lows:												
1939	[3]1,601	8-26	3,125	2-18	[2]229,127	10-12	71,152	10- 7	20,722	4-15	105,397	4- 8
1941	3,364	1-11	3,490	1-18	240,399	11-15	79,923	10- 4	28,382	4-12	90,914	7-12
1942	3,297	7- 4	3,393	5-23	231,896	12-12	75,934	12- 5	29,240	4-25	72,962	12-26
1943	3,821	1- 9	3,579	3-13	232,191	1- 9	68,182	10-16	30,732	4- 3	57,596	12-25
1944	4,357	1- 1	4,228	2-12	[4]220,623	9- 9	76,302	1- 1	30,232	4-29	49,737	3-18

TRENDS OF 1943 AND 1944

Trends in Week Ended:	Crude Oil Production Daily	Crude Oil Runs to Stills Daily	Crude Oil Stocks Week End	Gasoline Production Weekly	Gasoline Stocks Week End	Gasoil and Distillate Production Weekly	Gasoil and Distillate Stocks Week End	Residual Fuel Production Weekly	Residual Fuel Stocks Week End
1943:									
January 2	3,871	3,734	233,938	10,957	82,420	4,285	42,913	7,683	72,881
January 30	3,826	3,698	233,863	10,339	88,830	3,888	37,057	7,452	70,763
February 27	3,873	3,709	235,217	10,566	93,157	4,230	32,939	7,839	70,140
March 27	3,896	3,742	239,126	10,231	94,079	3,541	30,980	8,018	67,938
April 24	3,913	3,737	242,035	10,583	91,001	3,954	31,142	8,168	67,455
May 29	3,970	3,679	245,752	10,656	83,937	3,798	32,274	7,672	67,682
June 26	3,955	4,015	242,657	11,092	79,589	3,876	34,044	8,126	67,960
July 31	4,133	3,788	238,420	11,127	74,977	3,765	36,363	8,478	66,877
August 28	4,196	4,227	236,170	12,420	72,525	4,351	37,928	8,732	67,250
September 25	3,344	4,156	233,013	12,206	70,024	4,608	40,328	8,560	66,659
October 30	4,383	4,176	247,219	12,813	69,297	4,642	44,591	7,968	63,833
November 27	4,414	4,261	239,761	12,638	69,980	4,379	46,187	8,633	62,143
December 25	4,363	4,185	241,310	12,597	74,024	4,457	43,791	8,689	57,596
1944:									
January 1	4,357	4,453	240,992	13,192	76,302	4,575	42,310	9,141	57,330
January 29	4,409	4,359	240,251	13,427	81,085	4,054	37,266	8,889	52,857
February 26	4,423	4,377	237,137	13,183	85,248	4,558	33,766	8,952	51,387
March 25	4,385	4,443	236,285	13,362	87,287	4,979	31,319	9,013	51,669
April 1	4,383	4,435	234,667	13,824	89,162	4,450	30,530	8,367	51,326
April 29	4,431	4,300	235,342	13,126	88,462	4,284	30,236	8,398	49,985
May 27	4,514	4,532	234,423	13,502	86,468	4,702	32,035	8,568	49,812
July 1	4,587	4,638	228,860	14,052	83,559	4,496	35,360	8,872	52,235
July 29	4,608	4,627	225,112	14,115	82,665	4,833	38,135	8,900	56,280
August 26	4,667	4,698	222,931	14,112	80,740	4,566	41,543	8,680	59,839
September 2	4,657	4,592	223,482	14,265	79,921	4,664	41,964	8,293	59,876
September 9	[1]4,689	4,584	[4]220,623	14,093	79,576	4,440	43,053	8,999	60,785
September 16	[1]4,745	4,585	221,989	14,201	78,726	4,470	43,556	8,214	62,240
September 23	4,743	4,608	221,490	13,841	78,372	4,471	44,781	9,180	62,514
September 30	[1]4,762	[1]4,775	222,393	14,494	78,028	4,622	45,329	9,292	64,226
October 7 1944	**4,691**	**4,506**	.....	**14,252**	**78,554**	**4,706**	**46,078**	**8,676**	**64,644**
October 9, 1943	4,390	4,115	[5]234,643	12,281	69,014	4,780	40,513	7,816	66,883
Change:									
In week	−71	−269	+903	−242	+526	+84	+749	−616	+418
In year	+301	+391	−12,250	+1,971	+9,540	−74	+5,565	+860	−2,239
In year	+6.9%	+9.5%	−5.2%	+16.0%	+13.8%	−1.5%	+13.7%	+11.0%	−3.3%

[1] All time peak. [2] Lowest between January, 1922 and July 1, 1944. [3] Lowest since October, 1922, due to shutdown of six Mid-Continent states. [4] Lowest since December, 1921. [5] Stocks, October 2, 1943.

Wells Being Completed at Highest Rate Since Sharp Curtailment in Early 1942

September brought some further expansion of drilling, in reflection of the placing of additonal rigs in operation, and well completions increased to the highest level since the drastic cut-back of drilling just after Pearl Harbor. A further slight increase in rate of completing wells may occur for October, as there was another small gain in number of rigs in operation during September.

In the four weeks ended September 30, completions in the United States averaged 532 per week, compared with 495 weekly in August and 520 per week in July. The completion rate was still materially short of the trend in 1941, however, in spite of the fact that the number of rigs in operation had been increased to the highest level on record. This failure to get as many completions out of rigs in use has been explained by less experienced workers, delays in moving between drilling sites because of transportation difficulties, use of badly worn equipment, and other war-caused troubles.

Rigs in operation on September 30 totaled 4032 (drilling and rigging up), compared with 4011 at the beginning of the month and 2986 one year previously. Rigs in use have been increased to the present record level from only a little over 3000 at the beginning of this year.

Results in September indicate that there should not be too much difficulty in achieving or exceeding the goal that was recently set up by the Petroleum Administration for War for drilling in 1945—an objective of 27,000 completions. For the September rate of 532 completions per week, if extended over the 52 weeks of the coming year, would mean 27,664 wells. The continuation of the September completion rate through the rest of this year also would result in a slight exceeding of the PAW goal of 24,000 wells for 1944, as 17,897 completions have been recorded for the first nine months of this year, as shown in the table herewith. (This year's goal of 5,000 wildcats among the 24,000 completions also promises to be achieved, and PAW has called for the same number of wildcats in 1945.)

For the first nine months of this year, the weekly average rate of completing wells ran 26.8 percent above that of last year. Practically all states and districts have been more active this year than last year. Above-average increases have occurred in California (up 42.5 percent), Texas (up 44.4 percent), Kentucky and Mississippi (up more than 100 percent), South Louisiana (up 41.3 percent), Montana (up over 50 percent), New Mexico (up 47.1 percent), West Virginia (up 46.4 percent). Outstanding increases among Texas districts include those of 71 percent for West Texas, 76.4 percent for the upper Gulf Coast, 48.2 percent for the lower Gulf Coast, 72.2 percent for South Central Texas.

Probe Threatened Unless "A" Rations Are Increased

Senator Clyde M. Reed of Kansas, declared last week that unless 'A' gasoline rations were increased by two gallons a week by the time Congress returns next month he will demand a Senate investigation of the whole oil-control situation.

"The government could double the supply of gasoline for 'A' card holders without any jeopardy to military requirements if Petroleoum Administrator Ickes and others in authority really desired to do so," he charged.

U. S. Completions in First 9 Months 26.8 Percent Above Last Year

(Figures compiled from weekly reports of editorial staff men, with following exceptions: Illinois from Illinois Geological Survey except for September; Indiana from Indiana Division of Geology; Missouri from Missouri Geological Survey; Allegany, New York, and Bradford and Kane-Clarendon, Pennsylvania, from the Producer's Monthly; Tennessee from Tennessee Division of Geology)

State or District	MONTHLY COMPLETIONS: SEPTEMBER 1944 — Details for Sept. 1944 — New Wells: *Oil	Gas	Dry	Others[6]	Old Wells Deepened	Total Completions: Sept. 1944[1]	Aug. 1944[2]	Sept. 1943[3]	Total Footage Sept. 1944	CUMULATIVE COMPLETIONS: First 9 Months — Details Jan-Sept. 1944 — New Wells: *Oil	Gas	Dry	Others[6]	Old Wells Deepened	Total Completions: Jan.-Sept. 1944[4]	Jan.-Sept. 1943[5]	Percent Change in Weekly Average	Total Footage 9 Months 1944	RIGS IN OPERATION — Details for September 30 1944: Drilling	Rigs Up	Shut Down	Total: Drilling and R. U.: Sept. 30 1944	Aug. 31 1944	Sept. 30 1943
Alabama	3		5			8	4		43,730	10		19			29	2	+ 1360.0	143,412	3	1	1	4	8	
Arizona	10		1			11		4	60,891	10		7			17	4	+ 312.6	77,081						2
Arkansas	10		4			14	23	16	69,966	101	4	67			172	190	— 13.3	985,969	36		4	36	38	49
California	160	5	13		3	181	206	129	655,357	1,228	24	227		62	1,541	1,054	+ 42.5	5,474,122	340	39	31	379	401	328
Colorado	1		1			2	4		9,622	13	1	6			20	21	— 5.6	95,550	14	1	11	15	13	17
Florida												1			1			5,300	3	1	2	4	4	3
Georgia			2			2	3		13,636			7			7	2	+ 243.1	40,178	2			2	1	
Illinois	103	1	74	2	16	196	201	139	479,050	841	5	543	10	48	1,447	1,306	+ 8.0	3,647,301	192	31	16	223	214	189
Indiana	14	4	15		2	35	33	28	62,700	107	20	104		5	236	199	+ 15.7	439,707	36	11	8	47	45	42
Iowa												2			2	3	— 54.0	3,470	1			1	1	1
Kansas	71	6	28	4		109	156	128	380,080	666	38	563	21	7	1,295	1,239	+ 1.9	4,371,718	249	19	7	268	289	240
Kentucky	58	8	20		4	90	84	38	156,084	281	88	208	3	9	589	270	+ 112.9	1,089,163	84	15	11	99	95	70
Louisiana	31	9	30	1		71	73	50	470,166	320	34	210	4	4	572	466	+ 19.7	4,275,764	163	8	13	171	171	104
North	11	7	17			35	21	33	149,521	79	29	94	1	1	204	212	— 6.7	889,702	50	5	8	55	60	42
South	20	2	13	1		36	52	17	320,645	241	5	116	3	3	368	254	+ 41.3	3,386,062	113	3	5	116	111	62
Michigan	27	7	25			59	63	59	133,802	192	42	256		5	495	430	+ 12.2	1,200,175	99	11	27	110	116	110
Mississippi	17		10			27	15	8	167,081	72	2	72	1		147	69	+ 107.9	852,976	42	2	2	44	44	10
Missouri	4	1	2			7	8	4	5,617	12	5	16			33	21	+ 53.3	30,154	1		3	1	9	2
Montana	14	4	2			20	54	8	53,179	158	20	68	9		255	164	+ 51.5	645,804	44	16	37	60	57	56
Nebraska								4		3		4			7	35	— 412.6	17,740	2			2	1	1
New Mexico	16		6			22	39	36	77,771	188	14	89		5	296	196	+ 47.1	891,350	954	6	22	100	89	77
New York	68		2	38		108	100	118	149,994	591	2	13	336		942	906	+ 1.4	1,304,223	95	13	25	108	107	117
N. Dakota																					1			
Ohio	12	43	49			104	134	41	287,312	122	327	271	13	1	734	631	+ 13.4	1,933,469	168	24	40	192	200	181
Oklahoma	94	12	26	6		138	231	135	570,448	745	115	471	39	16	1,386	1,027	+ 31.6	4,834,125	419	37	22	456	489	313
Pennsylvania	142	45	9	120		316	308	221	603,680	1,068	213	59	960	1	2,301	1,883	+ 19.2	4,069,165	280	57	60	337	354	253
S. Dakota																					2			6
Tennessee																6		7,848						1
Texas	266	28	187	2	2	485	629	364	2,212,415	2,615	145	1,650	14	105	4,529	3,059	+ 44.4	20,403,104	1,142	58	133	1,200	1,123	680
E.Tex.Bord.		1	2			3	8		16,363	8	4	12			24	16	+ 46.3	145,066	8	2	1	10		7
E.Tex. Field														3	3	5	— 70.7	460						
R. E. Texas	12	1	12			25	16	22	155,060	101	4	109		1	215	171	+ 22.8	1,291,855	58	3	11	61	63	44
North	50	3	59	1	1	114	148	76	372,393	513	8	496	13	27	1,057	737	+ 39.8	3,130,995	130	6	20	136	137	115
W. Central	12	1	20	1		34	49	31	90,376	123	7	162	1	15	308	280	+ 7.2	729,710	62	3	32	65	62	56
West	101	1	12		1	115	172	91	516,735	936	9	198		42	1,185	676	+ 71.0	5,342,595	473	8	43	481	450	234
Panhandle	19	7	3			29		12	93,517	129	21	22		1	173	148	+ 14.2	544,921	126	14	10	140	108	32
Upper Coast	24	6	26			56	62	29	376,861	228	22	174		10	434	240	+ 76.4	3,123,019	110	8	7	118	113	66
Lower Coast	33	6	28			67	110	66	446,022	417	52	241		3	713	469	+ 48.2	4,507,075	113	7	7	120	132	94
Southwest	13	2	20			35	49	30	119,694	137	17	182		2	338	272	+ 21.2	1,343,056	42	7	1	49	40	24
S. Central	2		5			7	15	7	25,394	23	1	54		1	79	45	+ 72.2	244,352	20		1	20	18	8
Utah			1									1			1			4,743			5			2
West Virginia	9	82	20			111	82	59	301,468	63	555	96		1	715	476	+ 46.4	1,835,601	96	16	24	112	82	75
Wyoming	11		2			13	25	10	57,564	109	1	16	1	1	128	95	+ 31.1	567,983	60	1	27	61	60	48
Total U. S.	1,141	255	533	173	27	2,129	2,476	1,599	7,021,613	9,515	1,655	5,046	1,411	270	17,897	13,755	+ 26.8	59,247,185	3,665	367	534	4,032	4,011	2,986

* Includes distillate wells. [1] Wells completed in 4 weeks, or 28 days, ended Sept. 30, 1944. [2] Wells completed in 4 weeks, or 28 days, ended Sept. 25, 1943. [3] Wells completed in 5 weeks, or 35 days, ended Sept. 2, 1944. [4] Wells completed in 40 weeks, or 280 days, ended Sept. 30, 1944. [5] Wells completed in 39 weeks, or 273 days, ended Sept. 25, 1943. [6] Water input, gas injection, and salt water disposal wells.

PLAN YOUR PLANT DRIVE NOW!

Good organization will be needed to sell the 6th. The task of raising the huge sum required will be the most difficult ever asked of Industry. As each new military success brings us closer to Victory, the public naturally will feel that the urgency of war financing is lessened—whereas it isn't. So organize now to prevent a letdown on the home-front from causing a letdown on the fighting front. Build your plant's payroll campaign around this fighting 8-Point Plan. You don't have to wait for the official Drive to start—swing into action NOW!

1 **BOND COMMITTEE**—Appoint a 6th War Loan Bond Committee from labor, management and each representative group of the firm.

2 **TEAM CAPTAINS**—Select a team captain, for each 10 workers, from men and women on the payroll—but not in a supervisory capacity. Returned veterans make most effective captains.

3 **QUOTA**—Set a quota for each department and each employee.

4 **MEETING OF CAPTAINS**—Give a powerful presentation of the importance of the work assigned to them. Instruct them in sales procedure. Have them carefully study the Treasury Booklet, *Getting the Order.*

5 **ASSIGNMENTS**—Assign responsibilities for:
(a) *Music, speeches and announcements of the opening rally.*
(b) *Pre-drive letter to employees from management and labor.*
(c) *Competitive progress boards,*
(d) *Meeting schedules, etc.*

6 **CARD FOR EACH WORKER**—Dignify each personal approach with a pledge, order, or authorization card made out in the name of each worker. Provide for a cash purchase or installment pledge. Instruct each captain to put a pencil notation on the card to indicate the subscription he expects to solicit from each worker.

7 **RESOLICITATION**—People don't mind being asked to buy more than once. Resolicit each employee toward the end of the drive in a fast mop-up campaign. Call upon your State Payroll Chairman; he's ready with a fully detailed plan—NOW!

8 **ADVERTISE THE DRIVE**—Use all possible space in the regular media you employ to tell the War Bond story.

The Treasury Department acknowledges with appreciation the publication of this message by

THE OIL WEEKLY

This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council

Pipe Line Review

Contract Awarded for 17½-Mile Line in Kansas

Texas Empire Pipe Line Company has awarded contract to Midwestern Engineers, Tulsa, to lay 17½ miles of 6-inch gasoline line from Valley Center to Wichita, Kansas. Midwestern will also lay an 8-inch line across the Rock River for the Illinois Central Gas & Electric Company, connecting with its Rockford line.

35-Mile Oklahoma Line Delayed by Bad Weather

Continued wet weather has delayed construction work on Cities Service Gas Company's 35 miles of 16-inch line from near Blackwell to near Shidler, Oklahoma. Oil States Construction Company, Tulsa, has the contract and has completed one river crossing of the Arkansas River.

Survey Complete for Line From Elk Basin to Casper

Midwestern Engineers, Tulsa, has completed a telephone and telegraph line survey for the 240-mile pipe line for Stanolind Pipe Line Company from the Elk Hill Basin area to Casper, Wyoming, as well as a 67-mile link in the 24-inch natural gas pipe line being laid for the Tennessee Gas & Transmission Company from Corpus Christi, Texas, to West Virginia.

West Edmond Field to Get New 10-Inch Line

Oklahoma Natural Gas Company is reported making estimates and preliminary survey for 10 miles of 10-inch gas line to connect with Peppers Refining Company's new gasoline plant in section 34-14n-4w, in the West Edmond pool. The line will handle residual gas from the plant which is the only one in the field and is under construction.

Out-Bound Lines to Handle Texas Plant's Gas Residue

Out-bound transmission lines will receive the natural gas not utilized by the Phillips Petroleum Company's 50,000,000-foot daily natural gasoline plant being constructed by Phillips Petroleum Company in Hansford County, Texas Panhandle.

The plant will be supplied by the company's untapped reserve centering on the Hansford-Sherman County line and the Oklahoma Panhandle border.

Two West Texas Fields Given Pipe Line Outlets

Pipe line outlets for two fields in West Texas have been completed.

The Texas-New Mexico Pipe Line Company provided the Todd field, Crockett County, with its first outlet in completing a 17-mile, 6-inch discharge line that connects with its 12-inch trunk line at Ozona station. The area has been dependent upon tank trucks for an outlet.

Standish Pipe Line Company, subsidiary of the Phillips Petroleum Company, has built a 15-mile, 8-inch crude line from Embar field, Andrews County, thence southeast to its Goldsmith field gathering station and tanks in SE NE T&P Ry. 15, Block 44-T-1-S, Ector County.

The company's crude gathering from both fields is delivered to Gulf Refining Company, pipe line division. The Embar-Goldsmith line replaces an inadequate unit that delivered the Embar field output to Gulf Refining Company's North Goldsmith field carrier, and it marks the beginning of an extensive crude gathering system in the district, thus accounting for the large diameter pipe.

Robinson- Indianapolis Line Is Third Complete

Sheehan Pipeline Construction, Tulsa, has completed about one third of Ohio Oil Company's 105-mile, 8-inch line from Robinson, Illinois, to Indianapolis. Despite recent inclement weather the firm expects to finish the project in November.

Ten Miles of Mississippi Pipe Line Is Complete

Oklahoma Pipe Line Company has completed 10 miles of its projected 6-inch crude line that will serve Eucutta field, Wayne County, Mississippi. The line extends to Hiwannee, where a 10-car capacity rack has been installed on the G. M. & O. Railroad.

A 5000 barrel stock tank has been erected at the rack site. Standard Oil Company of Louisiana's price schedule for the field has top quotation of 98 cents per barrel for 30 gravity oil and above, and 80 cents for 22 gravity and below, with 2-cent differential applying to intermediate grades.

Colombia to Act Soon on Revised Petroleum Law

The state of seige, with government by decree, which has prevailed in Colombia for several months, will be lifted immediately, according to officials of the republic. The congress will be convened before the end of October, primarily to take action on the new petroleum law and revisions of the labor laws. Petroleum exploration and development activities in Colombia have been held up by operators pending passage of the new law, scheduled to have been put in force in January.

Venezuelan Concessions Depicted on Large Map

A map of the oil fields, concession areas and pipe line routes in northeastern Venezuela, printed on a scale of 12 miles to the inch, and up to date as of July 1, 1944, has been published by International Map Company, 90 West Street, New York.

The map is available with or without color denoting and identifying the 11 companies holding concessions. The location and configuration of 20 separate fields are shown, and the route of the new Creole pipe line from Jusepin to Puerto la Cruz is plotted. The map is 48 x 22 inches in size.

Tropical Wins Court Fight Over Colombian Concession

The Supreme Court of Colombia, in a recent decision at Bogota, sustained the claim of the Tropical Oil Company that its Mares concession was valid until August 25, 1951, thus extending the term for an additional five years against an attempt by the Colombian government to terminate the contract in 1946. But the court also ruled that all field installations must revert to the Colombian government without cost when the concession expires.

Colombian newspapers in reporting the findings in the case which had been argued for about three months, declared the decision created a sensation in Colombian business circles. The opinion was written by Justice Victor Cock and all members of the court concurred unanimously.

The De Mares concession was acquired by Tropical in 1919 from Roberto de Mares and Justo M. de la Espriella & Company. Later the Colombian government included provisions requiring the American company to install and operate a refinery with sufficient capacity to meet the demands of the nation. The Barrancabermeja pool is located within the concession.

In its decision the Colombian Supreme Court upheld an executive order which declared that the concession went into effect August 25, 1921, and denied the government's contention that the date should have been set in 1919 when the Tropical Oil Company first acquired the property from the De Mares interests, on the grounds that the government had imposed further obligations.

The court denied the Tropical's application to retain installations at the termination of the concession, declaring that the court could not override a provision which was expressly included for the benefit of the nation.

Casabe Oil to Be Moved by Andian Line in January

The ministry of mines and petroleum of Colombia has announced that Shell Petroleum Company of Colombia plans to begin shipping oil from its Casabe field to Cartagena via the Andian pipe line the middle of January.

The field, opposite Barrancabermeja on the Magdalena River, has 23 producing wells, with an estimated daily potential of 20,000 barrels. Since the Barco and De Mares areas are contributing nearly 70,000 barrels per day, Colombian officials are confident the country will produce at least 33,000,000 barrels during 1945, and regain fourth place rank among Latin-American nations.

Ten El Roble Producers

There are 10 producing wells in the El Roble field, north central Anzoategui, Venezuela, which are yielding 6000 barrels daily. The field is operated by Creole Company, under a joint interest arrangement with Pantepec Oil Company.

Report from Bahrein

No wells have been drilled on Bahrein Island in the Persian Gulf so far during the current year. Operations there have been confined to producing and refining activities. The refinery is in process of being enlarged at the present time.

U. S. Field Operations

Oklahoma

Logan County Gasser Is First for West Edmond

The West Edmond pool got its first gasser as Cities Service Oil Company's Gaffney 1, CSE NE 29-15n-4w, north end of the pool in Logan County, tested 25,000,000 feet of wet gas from the Bartlesville sand. With the Bois D'Arc section of the Hunton missing, operator plugged back to 6422 feet and drilled to 6497 feet when the well blew out, cutting connections and getting out of control for a short time. It was killed after being brought under control and will be perforated for completion.

Regular producing zone for the field is the Bois D'Arc in the upper part of the Hunton lime and the new gasser is nearly eight miles north of the nearest Bartlesville sand well. So far only small wells have been completed in that zone.

In NW NW 31-14n-4w, Oklahoma County, F. G. and W. J. Fox finaled Spivey 1 in the Bartlesville sand, flowing 317 barrels of oil in the first hour through 120 perforations at 6832-72 feet. The well tested the Bois D'Arc section but swabbed a small amount of oil and operator plugged back to 6990 feet. This gives West Edmond six Bartlesville zone producers including the gasser. More than 100 wells are active in the pool and completions average one daily. It is as wide as the Oklahoma City pool and although probably defined to the east it still has to be defined on the west in the Canadian County sector.

In Canadian County, Allied Oil Company's O'Brien 1, SE SE 12-14n-5w, was completed with cable tools flowing from Hunton at the rate of 300 barrels an hour. This, the first cable tool completion in the field, topped pay at 6918 feet and drilled out to 7008 feet. Production rate from open hole is about the same as through perforations so that this completions method appears to have no advantage over present field practice of perforating casing.

South Moore: Testing 20,000,000 feet of gas and 20 barrels of distillate through drill stem, Mid-Continent Oil Corporation's Westermier 2, NE NW SW 26-10n-3w, Cleveland County, proved the Bartlesville zone where production has been from second Wilcox. The well has been killed and is drilling to Wilcox. Zone tested was at 7720-45 feet. Mid-Continent's Mullins 2, NE NW SW 29-10n-3w, West Moore field, was preparing to shoot a tight Wilcox section at 8795-8873 feet; Turk 1, SW SW NE 29-10n-3w, was drilling below 8338 feet and reported checking slightly lower with other field wells.

Washita County: In the West Sentinel area, Gulf Oil Corporation continues testing Shields 1, SE NW SE 11-8n-20w. With plug set at 5615 feet, pipe was perforated with 234 shots at 6530-70 feet and the well swabbed 65 barrels of oil and five barrels of water in four hours and then went almost entirely to water, bailing about two barrels of oil and 20 barrels of water an hour. The Granite Wash is being tested. Total depth is 7200 feet.

Stephens County: After testing 15 barrels of oil and some drill mud in 24 hours, The Texas Company was preparing to shoot a zone in its Bateman 1, wildcat in the SW NW NE 21-2n-8w, after setting plug at 6310 feet. Canyon was topped at 5428 feet with 7-inch casing set at 6149 feet after a plug-back from 6418 feet. The wildcat is north of the Duncan area and northeast of the Wichita Mountains where a number of pools are located along a trend at the southeast and narrowing end of the Anadarko Basin feature.

Oklahoma County: East of the West Edmond pool, Gulf Oil Corporation plans a test in 22-14n-2w, in an attempt to explore for another Hunton stratigraphic trap. The block includes portions of sections 9, 10, 15, 16 and 22. Sinclair Prairie Oil Company, Mid-Continent and Harper Turner hold spreads in the block with the two major companies reported supporting the test.

McClain County: Testing continues at The Carter Oil Company's Johnson 1, CSW SE 30-8n-2w, Wilcox sand pool opener west of the Nemaha Granite Ridge. Initially rated at nearly 100 barrels an hour, the test developed salt water. Perforations at 8216-22 feet have been squeezed and the hole deepened 3 feet and re-cemented in attempt to get a complete water shut-off.

Logan County: Kerlyn Oil Company's Green 1, SE NW 36-18n-4w was completed flowing 170 barrels of oil a day from Layton sand through 2-inch tubing. The section is at 4807-33 feet, which was shot with 150 quarts for the test.

Moving Topping Plant to West Edmond from Texas

Denver Producing & Refining Company plans to move its topping plant from Gainesville, Texas, to a site on the Santa Fe Railroad at Edmond, Oklahoma, to run its own oil from a number of West Edmond wells. The Gainesville plant which has been shut down for some months has a capacity of 1500 barrels a day.

☆

LEWIS GRAY, 84, independent oil man of Tulsa, who was in the oil business for more than half a century before retiring several years ago, died October 8. Born in Sinco, Ontario, he entered the oil industry with his brother, operating under the name of Gray Brothers.

Wells Completed in United States in Week Ended October 14, 1944

Data preliminary and subject to revision. Revised and more complete data on all completions shown in monthly summary of drilling, published in second issue of each month. More detailed data on wildcats published in third issue of each month.

State or District	FIELD COMPLETIONS: New Wells *Oil	Gas	†Input	Dry	Total	Old Wells Deepened	WILDCAT COMPLETIONS *Oil	Gas	Dry	Total	ALL COMPLETIONS This Week	Last Week	Cumulative This Year	Cumulative Last Year
Alabama	....	....	....	....	....	....	....	....	....	....	....	2	31	2
Arizona	....	....	....	....	....	....	....	....	....	....	....	....	6	4
Arkansas	2	....	....	....	2	....	....	....	3	3	5	3	180	205
California	36	2	....	....	38	....	....	....	4	4	42	47	1,632	1,121
Colorado	....	....	....	....	....	....	....	....	....	....	....	3	24	22
Florida	....	....	....	....	....	....	....	....	1	1	1	....	2	2
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	6	2
Illinois	28	....	1	10	39	3	....	....	2	2	44	38	1,530	1,407
Indiana	3	1	....	3	7	....	....	....	1	1	8	14	258	213
Iowa	....	....	....	....	....	....	....	....	....	....	....	....	2	3
Kansas	22	1	1	....	24	1	....	....	....	....	25	38	1,358	1,337
Kentucky	11	....	....	....	11	1	1	....	4	5	17	21	612	305
Louisiana	5	2	....	3	10	....	1	....	1	2	12	11	595	501
North Louisiana	2	1	....	....	3	....	....	....	1	1	4	5	203	231
South Louisiana	3	1	....	3	7	....	1	....	....	1	8	6	392	271
Michigan	1	1	....	5	7	....	7	2	7	16	23	17	534	462
Mississippi	....	....	....	....	....	....	....	....	....	....	....	8	155	75
Missouri	....	....	....	....	....	....	....	....	....	....	....	1	36	22
Montana	....	....	....	....	....	....	....	....	....	....	....	19	274	172
Nebraska	....	....	....	....	....	1	....	....	....	....	1	1	9	36
New Mexico	11	....	....	2	13	....	....	....	....	....	13	10	319	211
New York	15	....	10	....	25	....	....	....	....	....	25	25	986	972
Ohio	5	9	....	7	21	....	....	....	....	....	21	9	712	657
Oklahoma	29	1	2	....	32	2	2	....	8	10	44	40	1,469	1,111
Pennsylvania	27	10	15	2	54	....	....	....	....	....	54	50	2,321	1,993
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	9	6
Texas	55	8	2	17	82	3	2	....	24	26	111	150	4,799	3,281
E.Tex.Bor. Co.'s	....	....	....	....	....	....	....	....	....	....	....	1	26	16
E. Texas Field	....	....	....	....	....	....	....	....	....	....	....	....	3	5
Rest of E. Texas	3	....	1	....	4	....	1	....	4	5	9	4	229	184
North Texas	9	....	1	7	17	1	....	....	3	3	21	28	1,108	805
W. Central Tex.	1	....	....	2	3	....	....	....	4	4	7	14	329	298
West Texas	18	....	....	1	19	2	....	....	3	3	24	50	1,260	725
Tex. Panhandle	6	1	....	....	7	....	....	....	....	....	7	9	189	155
G. Coast, Upper	5	1	....	4	10	....	....	....	4	4	14	17	465	253
G. Coast, Lower	8	5	....	....	13	....	1	....	1	2	15	16	746	500
Southwest Texas	4	1	....	3	8	....	....	....	4	4	12	8	358	292
S. Central Tex.	1	....	....	....	1	....	....	....	1	1	2	3	84	48
Utah	....	....	....	....	....	....	....	....	....	....	....	....	1	....
West Virginia	3	30	....	5	38	....	....	....	....	....	38	13	745	525
Wyoming	....	....	....	....	....	....	....	....	....	....	....	8	137	99
Total U. S.	253	65	31	54	403	11	13	2	55	70	484	528	18,740	14,745

* Includes distillate wells. † Includes salt water disposal wells.

Kansas

Ellis Pool Opener Given Potential of 75 Barrels

Sunray Oil Corporation's Younger 1-B, SE SE NE 6-14s-17w, pool opener for Ellis County 2½ miles west of the Toulon pool, has been assigned a potential of 75 barrels a day from Arbuckle lime at 3525-74 feet. Arbuckle was topped at 3523 feet and well drilled to 3574 feet, total depth.

Barton County: Vickers Oil Company's Workman 1, NEc 33-20s-12w, is a pool opener 2½ miles southwest of the Silica pool which produces from Kansas City-Arbuckle. Topping Arbuckle at 3410 feet and pipe set at 3408 feet, the well was drilled to 3455 feet, total depth, given 3500 gallons of acid and has been assigned a pumping potential from Arbuckle of 69 barrels of oil, 25 percent water, per day.

Stanton County: Stanolind Oil & Gas Company's Col-Mac 1, in the center of 32-30s-39w, about 6 miles west of the Hugoton pool, continues testing. With 7-inch set at 2702 feet in the Permian, casing was perforated at 2396-2405 and 2408-22 feet and after acidizing with 400 gallons the well tested nearly half a million feet of gas daily.

Stafford County: Continental Oil Company's Aiken 1, SE SW NW 20-22s-11w, Richardson pool outpost, topped Arbuckle at 3557 feet, where 5-inch was landed and was preparing to make production test. Isern Brothers et al's Ziegenbush 2, CSE SE SE 28-21s-1w, in the Fisher pool, tested 900 feet of oil in 15 hours from Arbuckle at 3606-18 feet. A small oil show was logged in Lansing lime at 3415-20 feet and Simpson sand was topped at 3541 feet.

Rush County: Two failures were reported for the county, Sunray's Jacobs 1, SW SW NW 3-16s-19w, plugged at 3640 feet after testing dry in the Simpson, and Adair-Morton's Schlitter 1, SW SE NE 18-16s-17w, plugged at 3553 feet after testing dry in Lansing lime.

Steven's County: Two good gassers were added to the Hugoton field. Panhandle Eastern Pipeline completed Miller 1, NW NW SE 30-32s-38w, for 13,000,000 feet daily from Permian at 2650 feet, total depth, and Northern Natural Gas Company got 25,450,000 feet daily in Lightcap 3, NE NE SW 2-33s-36w, from Permian at 2800 feet, total depth.

New Mexico

Permian Strike Involves Rare Structural Condition

Humble Oil & Refining Company's Leonard-Federal 1, C SW SW 12-26s-37e, first Ellenburger strike for Lea County and deepest producer in the Permian Basin, reached bottom-hole water when tester was used at 11,948-11,968 feet. Pipe will be set on bottom to complete through perforations opposite Ellenburger saturation at 11,816-11,948 feet. Four successful drill-stem tests made at intervals revealed maximum oil flow of 77 barrels hourly and 15,000,000 feet of gas daily. Drill-stem test at 11,890-11,948 feet showed peak rated flow of 40 barrels of 48.5-gravity oil hourly and 1,656,000 feet of gas daily.

This strike involves unusual structural conditions as the top of the Ellenburger is 2827 feet low to an Ordovician failure 6 miles north, while a 11,014-foot failure 1⅜ miles northeast of the latter is 2900 feet low on the Montoya.

Gulf Oil Corporation's Vivian Drinkard east of the Penrose sector of Lea County, halted at 6508 feet to run pipe for completion in the 6365-6420-foot Wichita-Albany, or Clear Fork lime. This wildcat flowed 25 to 35 barrels hourly through tester from this new Permian zone, which is equivalent to that of the Fullerton-Union area to the east in Texas.

West Texas

Upton County Has Promise Of Deep Permian Strike

Deeper pay in Emma field makes good flow, and 2½-mile northwest extension given the Welch area, Dawson County. Upton County has promise of deep Permian strike. Crockett County records shallow oil discovery. Ward County's Delaware discovery flows after shot.

Andrews County: The Texas Company's University-Magnolia 1-L, 1⅛ miles east of the Emma 4300-foot San Andres field, established deeper pay in flowing 214 barrels of oil on 7-hour test after using 2000 gallons of acid through perforations at 5310-30 feet. The well was shut in for 12 hours, then flowed 50 barrels oil in 1 hour. This production is from the Holt, found in the nearby Clabberhill pool and on west flank of the North Cowden field. Rig has been skidded to The Texas Company's University 1-M, north offset.

Champlin Refining Company's University 1-B, 3½ miles west of the north end of the West Andrews field, yielded water from Devonian perforations at 8440-79 feet with 5½-inch casing on bottom at 8536 feet, and will retest through perforations at 7930-8015 feet. Most promising pay was logged at 7135-7262 feet. Stanolind Oil & Gas Company's University 1-D, 1¼ miles to the south and on same structure, drilling cherty-lime at 8480 feet with last indicated production in Devonian, topped at 7965 feet.

Upton County: Humble Oil & Refining Company's Parrott 1, C SE SE E. L. Ry. Sec. 3, 3½ miles north by west of a temporary abandoned 10,384-foot wildcat, was drilling shale at 7730 feet on 11,000-foot objective after passing up prospective production in Lower Permian. Drill stem test at 7537-99 feet yielded sweet gas to surface in ¼-hour and the breakdown showed 220 feet of oil and gas-cut mud, 500 feet of free oil and 20 feet of water. This showing will result in a production test through casing if deepening proves negative, and is probably equivalent to showings passed up near the 7100-foot level by the Plymouth Oil Company's nearby deep test.

Ward County: Lion Oil Refining Company's University 1-B, previously listed as a prospective Delaware strike for the Quito district, flowed 200 barrels oil, plus 10 percent water, by heads daily after 43-quart nitro shot at 4976-90 feet. The gas volume is rated at 1,500,000 feet daily. The Delaware sand was entered at 4970 feet and drilled to 4994 feet. It is 2¾ miles northeast of an abandoned wildcat pumper that is lower on structure.

Dawson County: Richmond Drilling Company et al's Nelson 1, C SW NW E. L. Ry. Co. 34, Block M, and 2½ miles north by west of Welch pool pumper, has uncovered a more attractive oil area in filling 2000 feet with oil after drilling broken San Andres pay at 4805-45 feet with cable tools. It will be deepened and tested by stages, and at the above depth was considered 150 feet above water. Top of Yates sand was called at 3050 feet with elevation of 3103 feet, and structural position was further improved in the big lime section.

Crockett County: Garrett M. Smith et al's L. B. Cox Jr. 1, northwest corner I&GN Ry. 26, Block 2, and on a 12,500-acre lease, is opening a shallow oil pool with preliminary showing of 20 barrels of oil on 6-hour pumping gauge after using 2000 gallons of acid in broken pay at 947-1001 feet, having plugged back from sulphur water at 1167-70 feet. It is 16 miles south of the Todd field, nearest production.

Gaines County: Amerada Petroleum Corporation's Jones 1, wildcat and 3¼ miles southwest of Wasson field deep production, was drilling plugs from 5½-inch pipe at 7550 feet to test open hole to 7838 feet on the strength of nominal saturation noted in rotary returns. Most promising showings were logged at 7622-74 and 7722-62 feet with elevation of 3589 feet, and plans are to later perforate opposite. The latter is equivalent to the deeper pay at Wasson. Humble Oil & Refining Company's Doss 1, prospective Clear Fork discovery, swabbed 3 to 5 barrels of fluid hourly, varying from 98 to 75 percent pipe line oil, after using 1000 gallons of acid through perforations at 7030-7233 feet. This zone will be cemented, then reperforated.

Wildcats: Northern Ordnance, Inc's Spaulding 1, Northwestern Howard County, entered the Pennsylvania, Cisco zone, at 5995 feet with elevation of 2651 feet, and was drilling at 7200 feet. It is the first pre-Permian test for the county. In Northeastern Cochran County, Honolulu Oil Corporation's Hudson 1-9 was drilling lime 4220 feet, having entered brown lime at 3990 feet with elevation of 3709 feet, or 67 feet high to its Williams 1-78, a 5215-foot failure 1¾ miles to the southeast.

Stanolind Takes Over Permian Oil Company

Stanolind Oil & Gas Company, Tulsa, has acquired the capital stock of Permian Oil Company and has assumed operation of all properties, which include 53 producing oil wells in the Slaughter pool of West Texas and some undrilled acreage.

Producing wells have a daily allowable of 3,000 barrels. Consideration involved in the transfer, although reported from other sources at $4,000,000, was not closed by Stanolind officials. Stanolind Pipe Line Company operates a 12-inch oil line from the Slaughter pool to Drumright, Oklahoma, and Cushing and handles approximately 70,000 barrels of West Texas crude daily.

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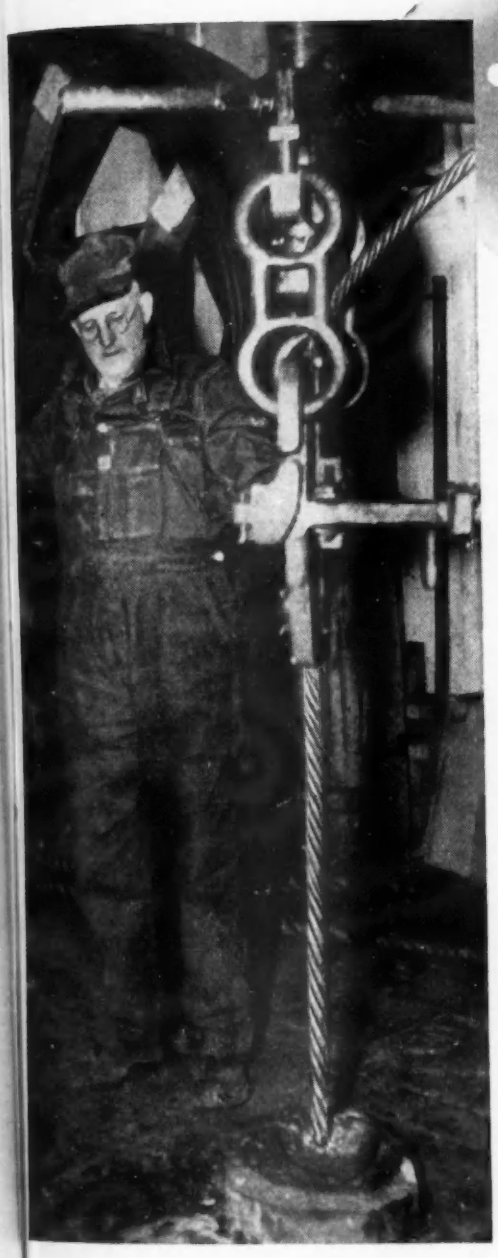

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North Texas

Jack County's East Bryson Field Gains Deeper Pay

Jack County's East Bryson field gained a deeper pay when Hanlon & Buchanan, Inc.'s Matlock 1, southwest corner of the A. H. Latimer survey, developed flowing production on preliminary test of Mississippi at 5311-44 feet, and has landed pipe to complete. Drill-stem test of the bottom 10 feet of the section yielded gas to surface in 2 minutes and oil spray in 11 minutes, indicating a flush producer.

Wilbarger County: Fain & McGaha's Martin 1, wildcat 3 miles west by north of the Farto field, improved its production outlook in logging additional oil-saturated lime at 4776-4803 feet, and halted at 4836 feet to cement pipe on bottom.

Cooke County: S. D. Johnson et al's Gatewood 1, MEP&P Ry Survey more than a mile east of the Lynn-T.C.U. field, pumped 35 barrels on 5-hour test from sand at 1568-81 feet. Phillips Petroleum Company's Inglish-Eppie 1, J. F. Davidson survey 4 miles south of the Dangle pool, was showing for small discovery in broken sand at 2396-2423 feet followed by 9 feet of oil saturated sand at 2432 feet. The well is bottomed in schist at 2508-10 feet. A pumper is assured from perforations at 2396-2404 feet, while water appeared after small nitro shot at 2426-32 feet.

East Texas

Cherokee Test to Explore 10,200-Foot Pettit Pay

Humble Oil & Refining Company's Stanley 1, 3500 feet south of its Larissa pool discovery in Cherokee County, recovered 570 feet of 38-gravity oil and 150 feet of oil and gas-cut mud along with water blanket when tester was used in Upper Glen Rose at 8484-8541 feet. This accounts for the appearance of oil and gas with rotary returns, although formation samples were void of saturation. This oil is believed to be from a crevice, and will be passed up to explore the 10,200-foot Pettit pay.

Van Zandt County: Northern Ordnance, Inc's Shelton 1, 1½ miles southeast of Martin Mills, failed to produce on swabbing test of Rodessa perforations at 8278-90 feet, and will be acidized. Nominal show was passed up at this level in drilling to Travis Peak at 8962-9200 feet. Magnolia Petroleum Company's Phillips 1, north offset to the Fruitvale pool's 8500-foot Travis Peak pumper, cemented protection string of 9-inch casing at 5201 feet in Georgetown, topped at 5158 feet.

Wood County: Amerada Petroleum Corporation's Gamblin 1, third test for the Winnsboro field, logged oil saturation in recovering 10 feet of core pulled at 7840-60 feet and in 4-foot recovery at 7860-80 feet. This is the upper Bacon zone, and the test was drilling 7905 feet to explore both pays before running pipe. Gulf Refining Company has provided a direct pipe line outlet.

Bobby Manziel et al's Herman Johnston 1, Manziel field deep test acquired from the Sun Oil Company at 8513 feet, was showing for a gas-distillate producer with closed in pressure on tubing and casing at 3000 and 2700 pounds, respectively. The new owner deepened the well to 8526 feet then landed 4½-inch at 8396 feet. Production is from the Rodessa, which has accounted for a small oil well, while the 8700-foot zone has yielded a flowing oil well and a small gas-distillate producer.

Hopkins County: Humble Oil & Refining Company's Nichols 1, Pickton prospect 4 miles northeast of the Coke field, cemented 7-inch casing at 8537 feet while bottomed in Travis Peak at 8567 feet to try for completion in top of Rodessa at 7865 feet. This wildcat is credited with 15 feet of effective pay.

Franklin County: Tide Water Associated Oil Company and Seaboard Oil Company's Minshew 1, C. F. McKenzie Survey, became the 17th consecutive oil completion for the New Hope discovery block in flowing 150 barrels of 42-gravity oil natural through 10/64-inch choke from Bacon lime perforations at 7334-42 feet. This test was drilled to 8052 feet. All other wells have been dually completed. The partnership is operating 7 rotaries on continuous schedule since the bulk of its block expires in 1946 unless productive.

Panola County: Arkansas - Louisiana Gas Company's L. Hudson 1, Isabella Hanks Survey 271, got a final completion gauge of 110,000,000 cubic feet of gas daily on open flow from perforations made in the Lower Pettit. The well is bottomed at 6608 feet with 5½-inch casing set at 6457 feet.

Sabine County: Coline Oil Company abandoned Temple Lumber Company 1, Larkin Groce Survey, at 9605 feet in lime. The well had previously been drilled to 5566 feet and abandoned.

Shelby County: Humble Oil & Refining Company's Pickering Lumber Company 1, Sebastain and Francois Survey, 10 miles east of Shelbyville, has spudded and will go to the Travis Peak.

Southwest Texas

Completion to Stand in Lavaca County Pool Opener

Moran Gas Company's Lell 1, which opened an oil field for Lavaca County, was unable to get the salt water completely shut off and has allowed completion to stand. During the potential test, taken through a ⅛-inch choke, it flowed 66.2 barrels of 35.4-gravity oil in 24 hours, along with 22 barrels of salt water. Tubing pressure is 320 pounds and casing pressure 560 pounds, while gas-oil ratio has been set at 151-1.

This field is 4½-miles southwest of Hallettsville in the James Kerr Survey, and the original hole was drilled by Jack W. Frazier of Houston, but Frazier turned the well over to Moran Gas Company after drilling to 7690 feet and setting casing at 5930 feet. The production is from a thin section with casing perforated at 5414-18 feet.

Medina County: A new producing horizon is being opened in the Chicon Lake field by A. A. Murrell, who is running a pumping test in his Murrell Fee 12. The field was opened in 1929 with a gas discovery well, and produces 19 and 20-gravity oil ordinarily from depths of 350 to 440 feet. Murrell 12 is a shallow well deepened to a new sand at 833-877 feet, which is estimated good for 5 to 10 barrels of 38-gravity oil daily on pump. Apparently it is a desirable oil, high in gasoline content, and should stimulate new drilling.

San Patricio County: Tide Water Associated Oil Company has made location for another test in the oil producing area opened at West Sinton. Its A. L. Simms 1 will be 2850 feet northwest of the Gerdes 1 discovery and is already building derrick. Tide Water's Dyer 1, 1450 feet southeast of discovery, is rigging up. The discovery well itself started production test through

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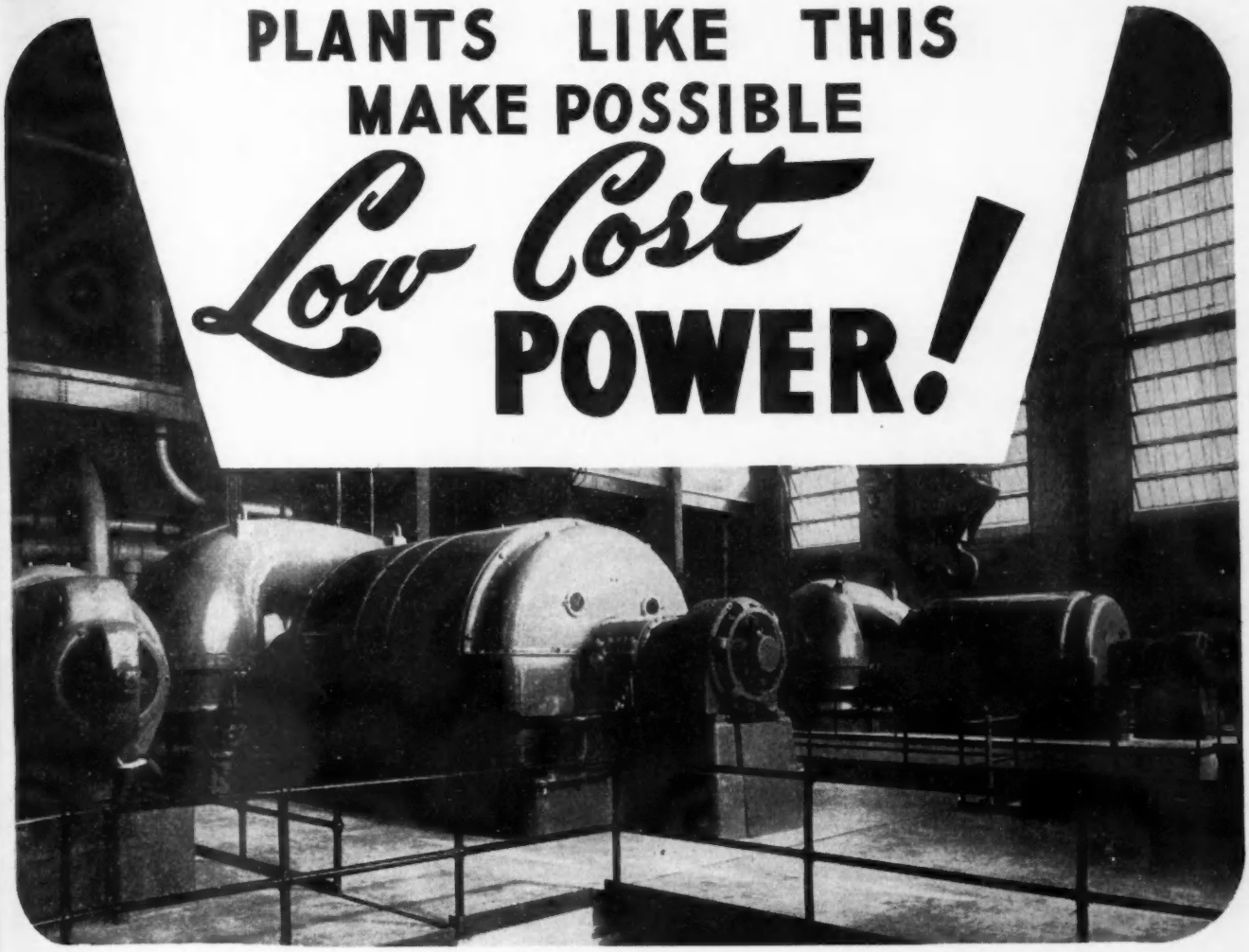

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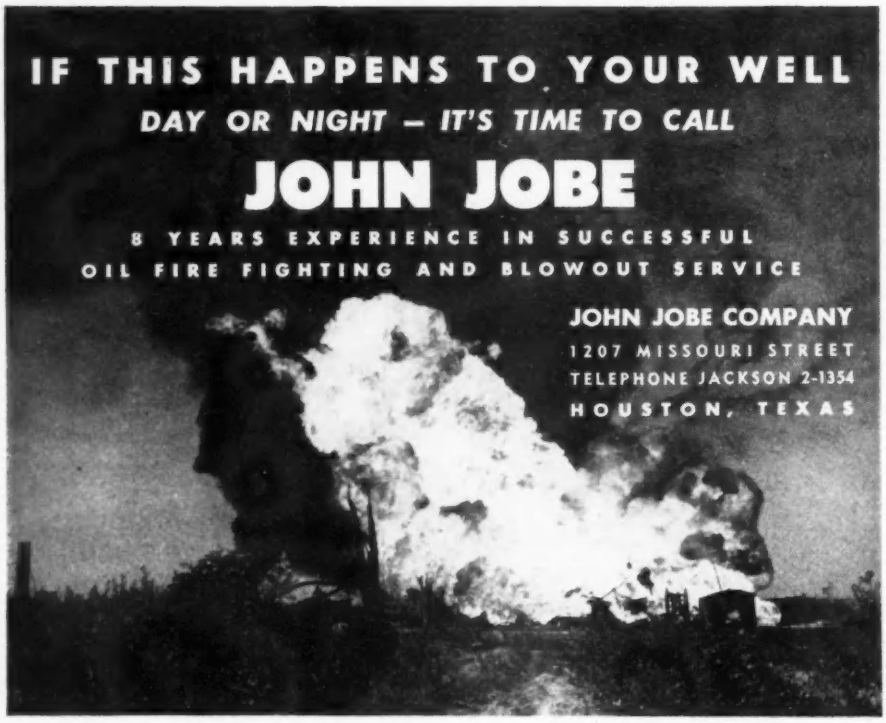
perforations at 3394-96 feet, and after flowing pipe line oil for 9 hours, started showing salt water and is shut in with a squeeze job in prospect to try to cut off the water. On preliminary tests it had made 25 barrels daily of 25-gravity oil through a 5/64-inch choke with 600 pounds pressure on tubing.

Atascosa County: Humble Oil & Refining Company's A. M. Lockwood 1, southwest outpost to the new Charlotte field discovery, is still testing, with casing perforated at 6892-97 feet in the Edwards lime, but swabbed dry with little showing. It was acidized and has been squeezed and reperforated and at latest report was swabbing 200 feet from bottom. It may perforate lower for the next test.

Nueces County: Blanco Oil Company and Al Buchanan have made location for a wildcat 4 miles northwest of Bishop scheduled to 8000 feet. Location is on the Luling Foundation lands in the Palo Alto Grant.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Texas Gulf Coast

Wharton Has Another Frio Sand Producing Area

Wharton County has another Frio sand producing area with completion of Amerada Petroleum Corporation's Charles J. P. Daboval 1, 8 miles southwest of El Campo. Potential test showed a flow of 80 barrels of 46.7-gravity oil in 24 hours through a ⅛-inch choke with tubing pressure 2150 pounds and gas-oil ratio 6570/1. The well drilled to 7430 feet and set casing at 7145 feet, which was perforated for completion at 7025-27 feet in the top of the lower Frio sand. Amerada's Mrs. Jeanette Reitz 1 in Section 72, northeast offset to the discovery well is a location.

In southwest Wharton County, 2½ miles northerly from Jackson County's East Mauritz field, Sam G. Harrison's Gus Schulze 1 was testing after having reported some high-gravity oil showing on initial try. At that time it was flowing through ⅛-inch choke with casing perforated at 5560-67 feet in Frio sand. Total depth is 6510 feet with the 5½-inch casing at 5665 feet.

Jasper County: Humble Oil & Refining Company's Nona Mills Company 1, deep test in the Rockland area, is setting 9⅝-inch casing at 8658 feet as protection pipe before drilling toward its contract depth of 12,000 feet.

Matagorda County: Skelly Oil Company's Granbury Fullilove Unit 1, wildcat test 3 miles northeast of Van Vleck in the Amos Rawls Survey, is standing cemented after landing the 7-inch casing at 8862 feet for tests of sands in the Frio. It was drilled to 10,010 feet before running final electric log and deciding to set the casing. It will probably start testing soon.

In the area south of Sargent, The Texas Company's Hamill 3 deep test is drilling below 12,042 feet in shale. In the same area, The Texas Company has a fishing job at 4985 feet in its Hamill 4.

Brazos County: Phillips Petroleum Company's Fannie Schoeps 3, on the west flank of the Millican Dome, is preparing to drill below the 9⅝-inch protection casing which has been cemented to about 9600 feet. It is projected to a depth of 12,000 feet for a test of the deep formations new to the Gulf Coast.

Harris County: Glenn McCarthy has made location for H. Reichert 1, on a 63.6-acre lease in the A. Scales survey in northern Harris County, scheduled to 7000 feet for a test of the Cockfield sand producing in the Eltex, Ltd. discovery well. Location will be slightly more than a mile south of the Spring townsite, and southwest of the Eltex producer.

Humble Oil & Refining Company's O. P. Woodburn C-1, north outpost to the Webster field, is drilling below 6150 feet in shale with no showings.

Liberty County: Gulf Oil Corporation's Kirby Lumber Company C-22, deepest test in the Cleveland field, has perforated for squeeze jobs at 9036-38 feet and at 9060-62 feet, and will probably perforate soon between these two points for a production test. The well was carried to 12,253 feet and has a

string of casing set to bottom, but has not tested the deeper formations.

Colorado County: Cities Service Oil Company has made location for another outpost in the Ramsey area, with Frank Stephens C-1 to be drilled in the Martin D. Ramsey survey 3551 feet southwest of the discovery well, Stephens B-1, and has indicated it will be drilled to 10,500 feet.

The company's Poole 1, northeast offset to the discovery well, has made another squeeze job in an attempt to get the water cut off from the gas-condensate it produced on preliminary tests, and is awaiting cement. Perforations had been made at 8885-90 feet and water is thought to have been coming from below the section being tested.

South Louisiana

Jefferson Davis Parish Location of New Oil Field

Continental Oil Company has opened an oil field in the Bayou Serpent area of Jefferson Davis Parish, completing its King Corporation 1 from the upper sand section with casing perforated at 7135-45 feet. On official Conservation Department test it flowed 178 barrels of 35.7-gravity oil daily through a 6/64-inch choke with tubing pressure 1025 pounds and casing sealed. Gas-oil ratio is 672-1. Total depth is 9302 feet and casing had been set at 8170 feet so a sand at 7780 feet might also be tested.

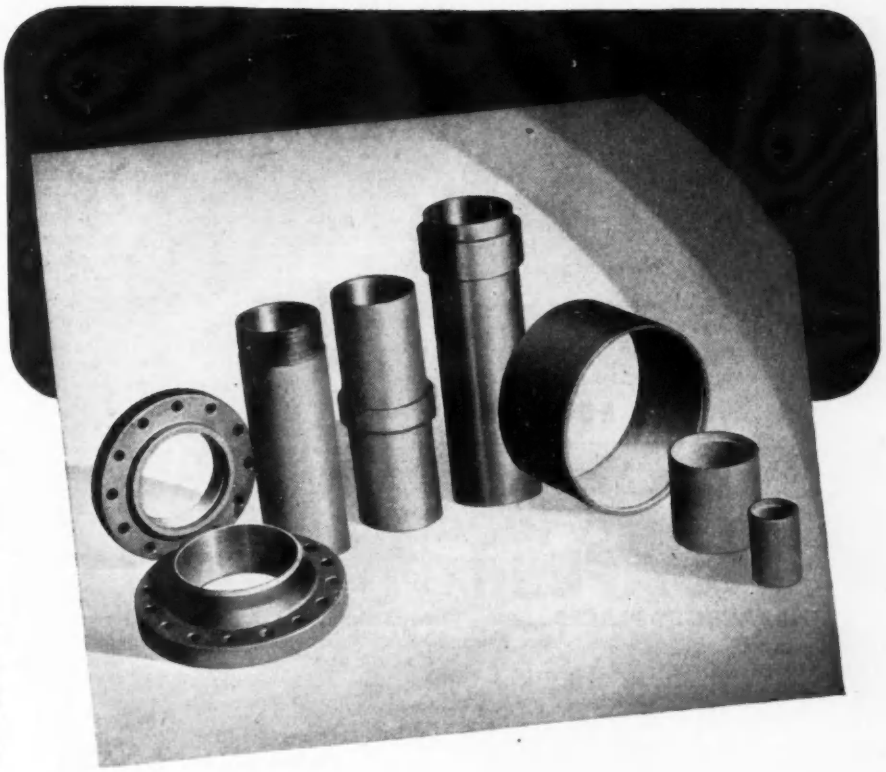
The field opened by Barnsdall et al with their Miller 1, west of Tepetate field has been named the "Fuselier Cove" field, and location has been made for Miller 2 by the same operators, 933 feet east. Final test showed the well flowing 793 barrels of 34.8-gravity oil daily through a ¼-inch choke with tubing and casing pressure equalized at 1400 pounds. No water was being made with the oil.

Calcasieu Parish: Continental Oil Company's Prairie Land & Canal Company 2, second well for the East Moss Lake field, is still testing through the perforations at 10,414-418 feet, but is showing 51-gravity distillate at the rate of 195 barrels daily with tubing pressure 5700 pounds. On 24-hour gauge it flowed 20 hours through a 12/64-inch choke and 4 hours through a 6/64-inch opening.

Plaquemines Parish: Gulf Refining Company's State-West Bay 10 PP, opening a new deeper sand for the West Bay field, has made a squeeze job to try to control high pressures and is scheduled to resume testing at once. On the first test, with casing perforated at 10-888-892 feet, it flowed 390 barrels of 30-gravity oil in 24 hours through a 5/32-inch choke with gas-oil ratio only 6335-1, but under tubing pressure of 5400 pounds.

St. Charles Parish: Shell Oil Company has made location for its River & Rails Terminals, Inc., Sec. 7-12s-8e, in the new Good Hope field recently opened by The Pure Oil Company. Since discovery, Pure has started another test, Humble Oil and Refining Company started one, and this will make the third active test for the field.

Acadia Parish: Sun Oil Company has spudded its Estherwood Townsite 1, new 11,000-foot test in 50-10s-1w, and is preparing to drill below the 96 feet of conductor pipe.



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North Louisiana

Bossier Parish Has New Gas-Distillate Field

Barnsdall Oil Company-Sohio Petroleum Company have opened a new gas-distillate field in Bossier Parish with completion of J. T. Hanks 1, 7-20n-12w, 6 miles northeast of Benton. On the first flow after cleaning into pits the well tanked 34 barrels of distillate in 14½ hours through ¼-inch choke on tubing. A later test of 8 hours, 15 minutes gauged 19.98 barrels of 58.4-gravity distillate, gas-oil ratio 29,000/1. Production is from the Bodcaw sand through 90 perforations opposite 8135-50 feet, Prior perforations were made above and below the pay and a squeeze job run. The well is shut in for storage, and operators have not decided to complete it or perforate in other horizons where shows of oil and gas were indicated by electrical survey. The well was drilled to total depth of 8765 feet in shale with 7-inch casing cemented on bottom since production was indicated in several series. Cotton Valley was topped at 7554 feet with shows at 8003-35 feet and 8368-86 feet. Shows were picked up in Travis Peak at 6036-44 feet, 6049-54 feet, 6084-92 feet. A drill-stem test of the Gloyd section of the Glenrose series at 4788-98 feet recovered 75 feet of salty drilling fluid with gas odor and oil scum.

De Soto Parish: A. W. Phillips and G. C. Schoonmaker's Anthony 1, 9-11n-14w, new gas-distillate discovery on the older Spider structure which has been blazing for two weeks, was finally put out by TNT which severed connections. Operators are planning to cap and bring the well under control. Anti-tank guns were used earlier to shoot off the Christmas tree, thus throwing flames straight up. The well was completed for an open flow of 125,000,000 feet of gas per day accompanied by 20 barrels of distillate per million feet, from sand perforated opposite 4876-80 feet.

Caldwell Parish: Shell Oil Company has installed mastergate and vent lines at Louisiana Central Lumber Company 1, NW¼ 31-15n-3e, a gas discovery which blew out of control while a fishing job was under way. Crews are preparing to rebuild derrick and then will attempt to run tubing into the well and kill it.

Jackson Parish: Shell cemented a string of 9-5/8-inch casing at 6675 feet in Tremont Lumber Company 1, C NW SE 22-15n-1w, which is at 6691 feet.

Big West Drilling Company has derrick up for its N. B. Gill Estate 1, C NW SE 35-20n-2w, which will seek Bodcaw production and possibly go to Smackover lime.

Webster Parish: Hunt Oil Company is drilling below 6075 feet with no further shows in Mrs. O. G. Roberts 1, 11-23n-10w. A 17-minute drill stem test from 5713-65 feet recovered 60 feet of oil and gas-cut mud with no showing of formation water.

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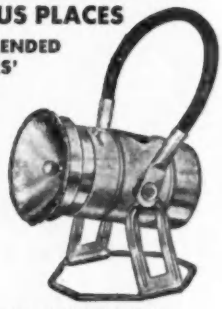

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Arkansas

Open Hole Completion of Union County Test Planned

McAlester Fuel Company will attempt an open hole completion of Wilson-McRae 1, C NW SE SW 28-16s-18w, second test in the Salem Church field of Union County. Depth is 7067 feet with 5½-inch casing cemented at 7065 feet. Test is to be made in the bottom of the 13-foot Smackover lime section, which is running 53 feet lower than the discovery.

Kerlyn Oil Company is rigging up rotary tools at Crossett Lumber Company 1, C SW SW NW 9-19s-10w, wildcat in Union County, contracted for 4000 feet.

Root Petroleum Company ran electrical survey in Union Saw Mill 1, C NW NW 27-18s-12w, Strong area, at 4300 feet, indicating top of Cotton Valley at 4085 feet. The well is drilling below 4835 feet but is running low on structure. Phillips Petroleum Company's Callie 1, wildcat in the Strong area, NWc 30-18s-12w, is moving in rotary.

Johnson County: Arkansas-Louisiana Gas Company's S. M. Hudson 1, C NE 15-10n-24w, deepest test ever drilled in Clarksville field, is drilling hard sand at 5840 feet, planning to test the Arbuckle lime. The test has reported no shows in the deeper horizons.

Pope County: Stanolind Oil & Gas Company is fishing for tools in G. B. Maxwell 1, C SE SE 18-8n-18w, at 3888 feet. Cable tools are being used and drilling is progressing slowly.

Miller County: Arkla Oil Company is at 5667 feet and fishing for twisted off drill pipe in R. T. Dodd 1, C SW NW 11-19s-28w. Electrical survey picked up top of Tokio at 3325 feet, Paluxy at 3960 feet and anhydrite at 5650 feet. No show of oil has been recorded at present depth.

Ouachita County: G. H. Vaughn's J. F. Halton 1, NE NE SE 28-15-28w, was perforated with 10 shots from 2666-73 feet and 10 more from 2673½-76½ feet, and tested salt water from the Travis Peak horizon. Perforations were squeezed and hole will be perforated higher up. Depth is 6264 feet, plugged back to 3700 feet. A string of 7-inch

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casing was cemented from 1954-3700 feet. The test picked up gas shows in the Nacatoch from 1905-50 feet.

Columbia County: Grady H. Vaughn has made location for Jackson 1, SW¼ 8-16s-21w, deep wildcat in the northwest edge of Waldo townsite, 2½ miles west of Hayden's Runyan 1, lime test drilled a year ago 4½ miles east of Buckner field production. Vaughn has had no indications of production in Bodcaw Oil Company 1, C NW NE 14-18s-23w, wildcat in the southwest section of the county. The Buckner was logged by samples at 9085 feet, 130 feet lower than in Gulf Oil Company's Lewis 1, SW NE 12-18s-23w, 1½ miles to the northeast. A core from 9225-43 feet, total depth, yielded 18 feet of porous oolitic lime with a salty taste.

Southwood Oil Company squeezed old perforations in the Smackover at 8283-92 feet with 75 gallons of plastic and reperforated in the same zone at L. H. Pearce 1, C NW NE 10-18s-20w, Calhoun field, in an attempt to recomplete the well which was brought in last June. It has been making salt water and has been shut in until workover rig was available. This is the first time plastics have been used in an attempt to eliminate water encroachment from the Smackover and will have a bearing on future treatment of these wells.

Midstates Oil Corporation brought in another good producer from the Upper Pettit in the Haynesville field, at Pipes-Beene 1, 2-20s-20w. The well flowed 900 barrels of oil in 24 hours through ¼-inch choke on tubing. Casing was perforated with 110 shots from 5522-40 feet and was treated with 5000 gallons of acid. Depth was 5605 feet, with string of 5½-inch casing set at 5597 feet.

Southeastern

Mississippi Wildcats More Active Than Field Wells

Mississippi's wildcatting activity is such that 23 wildcats were drilling recently while there were only 20 field wells drilling. This does not include field wells in process of completion or those not yet started drilling. There are 3 additional wildcats shut down, and 8 other locations not yet started. Principal delaying factor in a still larger wildcat program seems to be shortage of drilling rigs.

Lamar County: Gulf Refining Company's C. V. Cooper 1, Baxterville area, is coring below 8619 feet in shale and may be nearing the Massive Tuscaloosa section, original objectives of the well. It has already found 3 sections in the lower Eutaw and upper Tuscaloosa which may produce gas, condensate or oil, but wanted to test the Massive sand before trying to complete.

Shell Oil Company's Hibernia Bank & Trust Company 1, on the flank of the old Tatum salt dome, is drilling below 6250 feet in chalk, top of which was reported at 5746 feet.

Adams County: The Pure Oil Company's McDowell 2, southwest of the Cranfield field, is still making a series of squeeze cement jobs before attempting to complete in one of the two Tuscaloosa sands found while coring near bottom. The company likely will make the first test in the sand at 10,276-293

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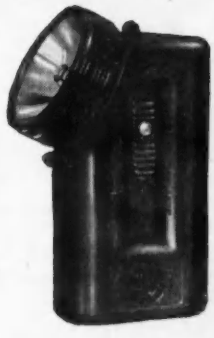

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feet which showed favorably on a drill stem test just before setting the casing at 10,293 feet. It later drilled to 10,330 feet and found still another sand at 10,305 feet. Both sands had water in the bottom, which is being isolated by the squeeze jobs.

Claiborne County: Sun Oil Company's W. R. Hammitt A-1 in 2-11n-1w is drilling out cement at 603 feet with total depth 655 feet. It was cemented when it tried to blow out from a heavy gas pressure. The first hole in this area was lost at 1800 feet when it blew out and caught fire.

Wayne County: Southport Petroleum Company's W. W. Evans 1, in 3-8n-6w, is standing at total depth of 6418 feet, awaiting orders after having run electric logging survey and taken side-wall cores. No showings have been reported.

Lawrence County: Sinclair-Wyoming Oil Company's Jefferson D. Riley 1, deep test in 14-9n-20w, is still drilling, now at 10,390 feet, although according to reports, all cores in the Massive section have shown salt water. Top of this section was reported at 9810 feet.

Jefferson Davis County: Gulf Refining Company's D. L. Mullins 1, southwest of the Sid Richardson discovery well in the Gwinville area, is drilling below 7286 feet in black shale after reporting top of Chalk at 6678 feet. It is still about 1500 feet above the Tuscaloosa.

Florida

Humble Oil & Refining Company is moving rig from its abandoned Gulf Coast Realties 2, deep test in Collier County, to Gulf Coast Realties 4, 20-48s-30e.

In Dade County, Humble's State 1, C NE NW 30-55s-35e, is drilling below 6900 feet in chalk, with 10-inch pipe cemented at 3810 feet. In Gulf County, The Pure Oil Company is still fishing for tools at a total depth of 3903 feet in C. C. Hopkins 1, C SW NE 31-6s-9e. Humble's G. C. Carleton Estate 1, C SW NE 34-38s-29e, Highlands County, has derrick up and is waiting on rig. Stanolind Oil & Gas Company's St. Joe Paper Company A-1, NE NE 15-2s-2e, Leon County, is running 10-inch casing at 1650 feet.

Georgia

Hunt Oil Company abandoned Superior Pine Products Company 1, Land Lot 363, Land District 13, Echols County, at 3865 feet.

Alabama

H. L. Hunt abandoned Robert Land 3, 36-11n-5w, Choctaw County, Alabama, after drilling to 3892 feet in shale. No oil shows were logged. This area east of the main Gilbertown field now has two small producers and a dry hole. Hunt is drilling below 6180 feet in Harry B. Jones Trustee 1, C SE SE 3-1n-11e, wildcat in Escambia County. A core was pulled at 5590 feet but information on formations is being withheld. Humble Oil & Refining Company's J. R. Williams B-1, C SW NW 20-6n-4w, Washington County deep test, is drilling at 6336 feet with no showing of oil. Also in Washington County, The Texas Company's N. S. Stallworth & Company 1, C SW NW 10-3n-3w, is drilling below 5185 feet with 10-inch casing set at 1030 feet.

California

Seal Beach Area Has First Selover Zone Producer

Standard Oil Company completed San Gabriel 29 in the Seal Beach Area, flowing 384 barrels per day of 26 gravity oil cutting 20 percent water and emulsion through a 20/64-inch choke, tubing pressure 730 pounds, casing pressure 1200 pounds. Gas flow was 770,000 cubic feet. Production is coming from the interval of 4897-4975 feet. The well is ¼-mile from production, north of the Seal Beach Fault, and is producing from the Selover, the first production from this zone in this area.

Drilling Permitted

The City Council adopted an ordinance granting the Seaboard Oil Company permission to drill in Chavez ravine opposite the United States Naval Armory near Elysian Park.

Fresno County: Superior Oil Company is rigging up Hanneman 83-30 in SE NE 30,15-17. Location is 2 miles northwest of the firm's recently abandoned San Joaquin 88-32 in 32-15-17 and a mile northwest of Brackney 68-30 in 30-15-17. Both logged showings in the Kreyenhagen and it is hoped in the new location a greater thickness of sand will be found.

Kern County: McDonald, Burns & Norris-Flickinger 1, in 36-30-24, McKittrick Area, was completed as a discovery, flowing 16,030,000 feet of gas through a 50/64-inch choke from 5147 feet. Production is coming from 4983-5147 feet.

Tide Water Associated Oil Company's Shafter Comm. 86-A7 in 7-28-25 is being abandoned at 12,618 feet in gray sand. A few oil shows were logged but insufficient to warrant a test.

Sacramento County: A. Oberholtz is rigging up for a gas test in SE SE 22-4-1. The test is expected to reach its objective at a maximum depth of 3600 feet and is midway between the Rio Vista gas field and the Kirby Hills area.

Solano County: Standard Oil Company's Suisun Comm. 3, in 5-3-1 was good for 7,350,000 feet of gas through a ½-inch choke from 3940 feet, opening up a new gas-producing area.

Rocky Mountain Area

Nebraska and Wyoming Wildcats Are Abandoned

The Texas Company's wildcat test of its Stratton Prospect in Hitchcock County, Nebraska, Taunton 1, SE NW NW 22-2n-35w, drilled into pre-Cambrian granite at 4662 feet and was abandoned at 4663½ feet.

Iron Creek: The Texas Company's Johnson 1-A, SE SW NW of Section 11-32n-82w, on Iron Creek in Natrona County, Wyoming, tested dry in the Tensleep sand, top at 3392 feet, and was abandoned at 3437 feet.

Huelett: Williams Brothers Corporation is building road for a 3500-foot Madison test of the Huelett structure in northwestern Crook County, Wyoming, NW NW SW 15-55n-67w. This is the first of its series of 4 test wells to

be drilled in the vicinity. The other 3 blocks are Poison Creek in 54n-67w, Tie Creek in 56n-65w, and Elkhorn in 55n-66w.

South Oregon Basin: Kirk Oil Com- will test to granite in its Unit 5 in SW SW SE 29-51n-100w, in the South Oregon Basin field, Park County, Wyoming.

West Rawlins: Cameron & Allen No. 1 well in NW NW NW 24-21n-88w, test of the Rawlins anticline, Carbon County, Wyoming, is moving in rotary equipment.

Oil Mountain: The Texas Company has spotted a location for its Madison test of Oil Mountain, Clark 1 in NE NE SW 35-33n-82w, north of its recently abandoned Iron Creek well, Natrona County, Wyoming.

Cedar Ridge: Husky Refining Company has released a location for its Tensleep test of Cedar Ridge in Hot Springs County, Wyoming, Government 1 in NE NE NE 28-43n-95w.

Illinois Basin

Wayne Clay City Field Extended by Discovery

The Pure Oil Company is extending the Clay City field of Wayne County at Jones 1, SW SW SE 24-1n-8e, a mile east of the Clay City field in the Mt. Erie area.

After an hour drill stem test at 3010-25 feet, during which 1400 feet of oil was recovered, casing was set for test of Aux Vases sand.

Coles County: Carroll et al's George Rudy 1, SW C 24-12n-7e, south edge of Mattoon, pumped 26 barrels of oil in 24 hours from Rosiclare sand at 1978-84 feet to extend the Mattoon pool. The well is still testing.

Wayne County: Much drilling may be expected in the Johnsonville pool if The Texas Company's Greathouse 1, S½ SE NW 27-1n-6e, near the center of the pool, is successful in the Devonian lime. Completed in the McClosky, the well is slated for deepening to the lower lime.

Richland County: Fulk and Craven's Martin Heirs, 1, SE NE NE 24-3n-8e, was showing for an extension of the Schnell pool to the north. During an hour drill stem test from 2980-3005 feet in the McClosky lime, the well showed gas in 3 minutes and flowed clean oil natural in 22 minutes.

Edwards County: Bonnie Heath is drilling below 1900 feet at Schmitler 1, NE NE NW 12-3s-10e, after recovering 450 feet of oil and 1200 feet of gas during an hour drill stem test of Mansfield sand at 1631-57 feet.

Hamilton County: Phillips Petroleum Company's Leach 1, SE SE NE 12-4s-6e, 1½ miles southeast of the Belle Prairie Pool and 2 miles northwest of the Blairsville pool, has been completed for 85 barrels of oil daily on pump from McClosky lime at 3425-35 feet.

Kentucky

Ross-Bartmes has a discovery nearing completion 3 miles southwest of the Poole pool, Webster county. The well, Hammock 1, 17-N-23, showed excellent saturation in Tar Springs sand at 1910-20 feet and without a drill stem test operators set casing to test the pay.

Michigan

Flow Test Fulfills Hopes For Well in Bay County

Shell Oil Company's Koth 1, SW NE NW 2-16n-4e, Fraser Township, Bay County, flowed an average of 47 barrels per hour by heads on an 8-hour production test and was choked to an average production rate of 100 barrels per day.

The flow test fulfilled expectations of a prolific well, after a shorter test two weeks ago immediately after a single shot perforation at 2900 feet.

The only open lease in the tightly blocked play, located ½ mile northeast of the well, was obtained by Sam Garfield of Clare, manager of Mammoth Petroleum Company, for a reported $30,000 cash payment and a ⅜ royalty. The block was taken after a seismograph survey by Shell.

Tuscola County: Shell's Woidan 1, NW NW NW 16-13n-11e, Novesta Township, after 130 perforations to possible Monroe pay section between 2892 and 3464 feet, showed oil on gun but on a shutdown test developed nothing of importance and may be abandoned.

Montcalm County: Gordon Oil Company's Paris 1, SE NW NW 6-12n-8w, Cato Township, wildcat, carried estimated 800 feet of oil and water, perhaps from shallower horizon, in the Monroe at 3525 feet and was shut down to test. Dundee lime, logged at 3429 feet carried water at 3473-83 feet.

Mecosta County: Two more Dundee failures, Sun's north offset and Gordon's southeast offset to the Church 1 mile extension discovery west of the Fork field, placed a damper on the district's prospects. Previously Gordon had drilled the south offset dry. While 5 wells are still drilling on the strength of the extension, its importance now is questionable. The extension had a 1500-barrel per day potential in the Dundee lime-dolomite section.

Ogemaw County: Sun Oil Company plugged back and perforated Holshoe 1, N½ SW SE 17-22n-4e, Logan Township, wildcat, for a 700,000-foot gas producer in the Berea sand at 1408-22 feet. It was drilled originally to 4537 feet, testing Traverse, Dundee and Monroe sections for oil.

Isabella County: Sohio Petroleum Company's Cummings 4, N½ NE NE 32-16n-6w, west offset to the Coldwater field discovery, averaged 35 barrels per hour from the Dundee after 84 shot perforations at 3689-3710 feet to establish it as the best of 4 producers completed.

WESTERN CANADA

Devonian Strike Brings Large Scale Lease Play

California - Standard Oil Company's oil strike in the Devonian limestone near Princess has brought on a large scale lease play in this part of the Southern Alberta Plains, comparable to the big play two years ago in the Taber area, 80 miles southwest.

More than 650,000 acres of petroleum and gas rights have been acquired by Standard and other operators, blanketing the bulk of rights within a 25-mile radius of the Devonian strike. Negotiations are now under way that should soon boost the acreage under lease or reservation to about 1,000,000.

California-Standard, which held about 25,000 acres surrounding its Princess-C.P.R. 8 discovery well at the time of the strike a few weeks ago, has increased its holdings to about 340,000 acres, fanning out 28 miles north of the Princess 8 well, 25 miles south, and 15 miles west.

Francis P. Byrne and associates, active Alberta Independent operators for many years, have taken up about 80,000 acres, half being about 25 miles east and north of the Princess 8, and the remainder about 14 miles southeast of the well.

Norman G. Lacey and associates, another group of active independents, have taken approximately 80,000 acres between the Byrne blocks, and 12 miles east of Princess 8. Pacific Petroleums and other independents have jointly taken up 61,500 acres, extending south from a point 4 miles south of Princess 8. George McMahon, another independent operator, has acquired more than 26,000 acres 9 miles southwest of Princess 8.

Meanwhile, the Princess 8 well—which started the lease play—is still "on test," flowing through small diameter chokes (3/64ths to ⅛ of an inch) at rates varying from 150 to 400 barrels daily. The well is producing from the Devonian lime between 3960 and 3982 feet.

California - Standard's Conrad - Province No. 77-33B, extension test ⅜ mile southeast of the Conrad-Province 2 discovery, has completed 13½ feet in the Ellis sand at 3079½ feet, with drill-stem test showing an oil rise of 1196 feet in an hour—a show comparable to the discovery well, now pumping 114 barrels daily of 25.6-gravity crude. Casing has been set, and production tests will start in a few days.

Reflecting the increased Alberta Plains Devonian lime interest resulting from the Princess 8 strike, majors and independents have joined to provide the first Devonian test in the Taber area. The well selected for the test is Mid-Continent-Universal 1, in lsd 12 17-9-17w4th, West Taber area. The well is bottomed at 3267 feet, in the base of the Taber sand, with a 10-15 million foot gas flow and some oil showing. The Devonian is looked for between 4300 and 4350 feet, the overlying Madison being somewhat thicker than in the Princess area.

Reconditioning Report

The Bureau of Mines has released a report on "Wartime Application of Air-Gas Injection and Oil-Well Reconditioning in the Appalachian Region," surveying the possibilities of methods for secondary recovery and describing projects which have been undertaken with success.

Prepared for operators in the Appalachian region, much of the report is applicable to other sections of the country if proper allowances are made for their differing economic, reservoir and operational conditions.

U. S. Exploratory Completions

ARKANSAS WILDCATS

Nevada County—Failure: G. H. Vaughn's J. K. Nixon et al 1, sw ne se 6-15s-20w, elev 334 ft, Nacatoch 1425 ft, Buckrange 2135 ft, Tokio 2415 ft, James 3215 ft, abnd 4215 ft.

Union County—Failures: J. R. Lockhart's H. C. Armor 1, 660 n 330 w of sec sw nw 32-16s-14w, elev 203 ft, Cotton Valley 3895 ft, Buckner 5760 ft, Smackover 5852 ft, abnd 5868 ft.

Kerlyn Oil Co.,'s Saw 1, c nw sw ne 17-17s-11w, elev 93 ft df, Cotton Valley 3450 ft, Buckner 5360 ft, Smackover 5455 ft, cored 5465-70 ft, lime sso, abnd 5550 ft.

CALIFORNIA WILDCATS

Butte County—Failure: Richfield Oil Corp.'s Hamilton-Nord 1, se sw 9-22-1, gas test, abnd 5320 ft.

Fresno County—Failure: Superior Oil Co.'s San Joaquin 88-32, se se 32-15-17, drill stem test some oil, abnd 7310 ft.

Kern County—Failure: Richfield Oil Corp.'s S. P. 10, 15-15, nw se 15-11-19, abnd 7309 ft.

Los Angeles County—Failure: Fowler Drlg. Co.'s Saunders 1, sw se 13-2-11, abnd 4030 ft.

FLORIDA WILDCAT

Leon County—Failure: Stanolind's St. Joe Paper Co. 1, c ne ne 15-2s-2e, junk & abnd 490 ft.

ILLINOIS WILDCATS

Clay County—Failure: Skelly's Johnson 1, sw sw ne 29-4n-7e, abnd 3108 ft.

Crawford County—Failure: Sohio's Townsend 1, sw sw nw 7-5n-13w, abnd 2634 ft.

INDIANA WILDCAT

Warrick County — Failure: Cherry Kidd's Bondholders Protective 1, sw se sw 8-5s-7w, abnd 1775 ft.

JENSEN UNIT likely to improve any well

For 25 years we have concentrated on making wells more profitable and satisfactory when JENSEN equipped.

JENSEN Unit owners from coast to coast and Gulf to Great Lakes will tell you we've done a darned good job.

It is easy for any producer to ignore JENSEN Pumping Units. Unfortunately, there is nothing remarkable about the appearance of a JENSEN. The difference is in the way it performs—the fact that a well is likely to be more profitable, more dependable, more satisfactory in a number of ways.

It will interest you to talk with JENSEN owners about this, and your JENSEN dealer. See our Composite Catalog pages. Write for Bulletin No. 27.

JENSEN BROTHERS MANUFACTURING CO.

. . . Coffeyville, Kansas, U. S. A.

EXPORT OFFICE: 50 CHURCH STREET, NEW YORK CITY

KANSAS WILDCATS

Butler County — Failure: Adair Morton's Bennett 1, se ne se 15-29s-7e, Miss 2779 ft, Arb 3195 ft, abnd 3198 ft.

Cowley County—Failure: Texas Co.'s Graham 1, ne se se 7-32s-4e, Miss 2987 ft, Misener 3332 ft, Arb 3340 ft, abnd 3460 ft.

Graham County—Failure: Phillips' Chas. 1, sw sw nw 2-9s-22w, abnd 3810 ft.

Marion County—Failure: Westgate Greenland's Brown 1, nec sw 7-17s-3e, Arb 3231 ft, abnd 3262 ft.

Norton County—Failure: Allen & Aylward's Fed Land Bk 1, ne ne sw 33-3s-22w, Lans 3500 ft, Arb 3763 ft, Gr Wash 3815 ft, abnd 3864 ft.

Ottawa County—Failure: Phillips' Chartier 1, ne se nw 28-9s-1w, Lans 2038 ft, Miss 2645 ft, Hunt 2962 ft, Vi 3326 ft, Simp 3448 ft Arb 3566 ft abnd 3596 ft.

Reno County—Failure: Ohio's Collingwood 1, sw sw nw 5-26s-6w, Misener 4007 ft, Vi 4028 ft, Simp 4053 ft, Arb 4146 ft, abnd 4202 ft.

Rooks County—Failure: Sinclair Prairie's Hull 1 nwc se 26-7s-18w, Arb 3455 ft, abnd 3560 ft.

Sedgwick County—Oil Discovery: Braniff & Sandy Hoil's Sutter 1, sec ne 22-29s-2w, pot 205 bbls oil, 55 bbls wtr, 1000 gals acid 3035-36 ft, td 3036 ft.

Sumner County—Failure: Soughland Royalty's Callery 1, ne nw nw 28-34s-1e, Lay 3034 ft, Miss 3717 ft, Cher 3555 ft, abnd 3764 ft.

KENTUCKY WILDCATS

Daviess County — Oil Discovery: Shell's Hamilton 1, 14-O-27, pump 37 bbls, Cyp 1833-45 ft, td 2358 ft.

Daviess County—Failures: Miller & Shiarella's Payne 1, 23-O-27, abnd 1463 ft.

J. C. Ellis' Keene Est 1, 17-Q-27, abnd 1973 ft.

Hopkins County—Failure: H. L. Browning's Moseley 2, 20-H-25, abnd 1240 ft.

Union County—Failure: Ashland O & R Co. et al's Buckman 1-A, 18-P-20, abnd 925 ft.

NORTH LOUISIANA WILDCAT

Lincoln Parish — Failure: Southwest Gas Prod. Co.'s V. W. Colvin Heirs 1, 330 n&e of c 7-19n-2w, elev 137 ft, Midway 1370 ft, Nacatoch 2078 ft, Massive 3880-4106 ft, td 6100 ft in Travis Peak, pb and abnd 5280 ft.

SOUTH LOUISIANA WILDCAT

Jeff Davis Parish—Oil Discovery: Barnsdall Oil Co.'s P. & M. D. Miller 1, start common cor sect 36, 38, 39, go ne alg nwl sect 38 for 3040 th se at ra 661 to lcn in 38-7s-3w, W. Tepetate area, perf 48 shots 8516-28 ft, flow 793.8 bbls oil 34.8 gr, 852,000 gas, ¼-in, td 10,032 ft.

MICHIGAN WILDCATS

Allegan County—Failure: J. W. Lang's Bussies 1, ne sw nw 25-4n-15w, Traverse lime, abnd 1641 ft.

Bay County — Fraser Discovery: Shell's Koth 1, sw ne nw 2-16n-4e, Dundee 2823 ft, perf 1 shot 2900 ft, flow 376 bbls oil 8 hrs, td 3012 ft.

Ogemaw County — Logan Gas Discovery: Sun's Holshoe 1, n½ sw se 17-22n-4e, Berea 1405 ft, pb 1475 ft, perf 1408-22, gauge 700,000 gas, td 4537 ft.

Ottawa County—Failure: C. A. Perry's Wesseldyke 1, ne ne ne 24-6n-15w, Traverse lime 1630 ft, abnd 1643 ft.

Voorhees Dr. Co.'s Nagerkirk 1, ne se sw 20-5n-14w, Traverse lime 1554 ft, abnd 1659 ft.

MICHIGAN OUTPOSTS

Roscommon County—Failure: Sun's State A-1, s½ nw se 6-24n-4w, 1 mi e E. Norwich field, Richfield lime, abnd 4552 ft.

Sanilac County—Failure: Herdell and Merrill's Pringle 1, ne se nw 2-12n-13e, Traverse 1500 ft, Dundee 2123 ft, Sylvania 2941 ft, abnd 3001 ft.

MISSOURI WILDCAT

Vernon County—Failure: A. W. Waymire et al's Stubblefield 1, nw se sw 21-37n-32w, Pre Cam 1405 ft, abnd 1525 ft.

OKLAHOMA WILDCATS

Garvin County — Failures: Fox & Fox's Butler 1, sw nw se 9-1n-1w, abnd 3036 ft.

E. J. Kubat's Dixon 1, ne sw se 9-3n-1e, McLish 3580 ft, abnd 3610 ft.

Garvin County—Oil Discovery: Ohio's McKinney 1, c ne se 18-3n-2e, flow 227 bbls 33.4-gr, Burns sd 2866-92, td 2892 ft.

Grady County—Failure: Skelly's Godwin Comm 1, c se nw 8-5n-8w, Pontotoc 3560 ft, Penn 4560 ft, Hoxbar 4600 ft, Oolitic lm 6320 ft, Wade sd 6450 ft, Medrand 8852 ft, Marchand 9586 ft, abnd 10,404 ft.

Jefferson County—Failure: Bridwell O&G Co.'s Trout 1, se sw sw 32-7s-7w, abnd 2281 ft.

Lincoln County—Failures: Texas Co.'s Barrett 1, sw sw ne 19-13n-6e, Hunt 4260 ft, Wx 4510 ft, abnd 4560 ft.

L. B. Jackson's Blakely 1, ne nw nw 21-15n-5e, 1st Wx 4465 ft, 2nd Wx 4483 ft, abnd 4505 ft.

Okfuskee County—Oil Discovery: Kubat & Phillips' Overall 1, sw sw nw 15-11n-9e, flow 135 bbls 43-gr oil, 40 bbls wtr, ¼-in, perf 3898-3910 ft, 2000 gals acid, td 4123 ft.

Seminole County — Failures: Mealy-Wolf's Pilot Island 1, se se se 24-9n-7e, Booch 3232 ft, Gil 3320 ft, 1st Crom 3483 ft, 2nd Crom 3550 ft, abnd 3584 ft.

McIntyre et al's Cornelius 1, sw sw sw 18-

11n-8e. Wapa 3665 ft, 1st Crom 3695 ft, abnd 3711 ft.

WEST TEXAS WILDCATS

Howard County—Failure: Skelly's Wilson 1, 2006 ft snl 1958 ft ewl H&TC Ry. 16, blk 27, elev 2504 ft, abnd 4735 ft.

Loving County—Failure: Standard of Texas' Link 1, c nw ne T&P Ry. 22, blk 55, Tsp. 2, elev 2889 ft, Delaware lime 3915 ft, abnd 4080 ft.

WEST TEXAS NEW PAY TEST

Andrews County—Emma Field Deep Failure: Stanolind's University 1-F, se se sw sec 25, blk 10, elev 3188 ft, San Andres 4326 ft, Glorietta 5495 ft, Clear Fork 5585 ft, abnd 5619 ft.

WEST CENTRAL TEXAS WILDCATS

Coleman County—Failure: Patrick A. Trapp et al's Stevens 1, 660 ft out swc se HT&B Ry. sec 21, abnd 702 ft.

Shackelford County—Failures: W. S. Churchill et al's Davis 1, 920 ft nsl 220 ft wel T&P Ry. 1, blk 13, abnd 1686 ft.

Hedrick Oil Co.-Jones & Stasney's Nail 1, c sw¼ E.T. Ry. 92, elev 1834 ft, abnd 1694 ft.

WEST CENTRAL TEXAS NEW PAY TEST

Stephens County—Deep Failure in Unnamed Field: T. P. Coal & Oil Co.'s S. R. Hill 7-A, 990 ft nsl 330 ft fr m/w/el of S.P. Ry. 16, blk 2, elev 1184 ft, Bend 3248 ft, Mississippi 4465 ft, abnd in Ellenburger 4608 ft.

SOUTH CENTRAL TEXAS WILDCAT

Bastrop County—Failure: Gordon M. Griffin's C. Y. Powell 1, 1000 fr sel 2725 fr nel 2100 fr swl J. C. Welchmeyer sur A-355, abnd 2202 ft.

SOUTHWEST TEXAS WILDCATS

Duval County—Failures: Argo Oil Corp.'s Rufino Garcia 1, 660 fr e&sl lot 3 660 fr sl blk 3 Copita Farm & Garden Trs. 75-ac lse, 8 mi w nw of Falfurrias, abnd 6700 ft.

Argo Oil Corp's Frank Vaello, Jr. 1, 2323 n of sl J. S. McCampbell sur 536 330 s of sl sur 372 330 fr n&wl of 250-ac lse, elev 493 ft, abnd 4500 ft.

Jim Hogg County—Failure: Sun's A. C. Jones 5, 9500 fr wl 13500 fr nl 44,323-ac lse, Agua Nueva de Abajo Gr, abnd 4702 ft.

Starr County—Failure: T. E. Stephens' M. Hinojosa et al 5, 1401 fr nl 4767.1-ac lse in porc 109-111, test in porc 111, abnd 2140 ft.

LOWER TEXAS COAST WILDCATS

Bee County—Failure: Joe Cosner's Isabella Linke 1, 330 fr nl 660 fr el Bee CSL sur 13, 4 mi s of Beeville, on 200-ac lse, abnd 4206 ft.

Lavaca County—Oil Discovery: Moran Co.'s Joe W. Lell et al 1 (OWWD), 620 fr wl 700 fr nl 40-ac tr n½ of e 75-ac of L&L lse, Jas. Kerr sur 9, 4½ mi sw of Halletsville, temp abnd 7690 ft, pb 5930 ft, perf 5914-19 ft, flow 66.2 bbls 35.4-gr, 33% wtr, ⅛-in.

TEXAS GULF COAST WILDCATS

Galveston County—Failure: Pan American Prod. Co.'s University of Texas 1, 1979 e 330 s of nwc Univ. Land lse in H. B. Littlefield sur A-143 on 100-ac lse, abnd 7012 ft.

Liberty County—Failure: Texas Co.'s Geo. A. Moore et al 1, start e cor Malinda Whittington sur A-390, go nw alg nel 4450 ft th 660 w at ra 2118.7-ac lse, 2 mi ne of Devers, abnd 6908 ft.

Matagorda County—Failure: Sun's Braman-Crier 1, 4620 nw of sel 660 ne of swl 3145-ac lse and John Crier sur, n of N. Markham field, elev 65.5 ft, td 9500 ft, pb&st to core shallow sd, abnd 1810 ft.

Waller County—Failure: Kirby Pet. Co.'s G. A. Kellner 1, 5561.9 w of el 1123 n of sl 317-ac lse, W. Cooper sur, 4 mi sw of Brookshire, sw in perf at 2812-22 ft, 2830-46 ft, abnd 3347 ft in anhy.

EAST TEXAS BORDER COUNTIES WILDCAT

Sabine County—Failure: Coline Oil Co.'s Temple Lbr Co. 1, (OWDD) 1900 fr wl 200 fr nl of Larkin Groce sur, otd 5566 ft, base Austin 7600 ft, Glenrose 8615 ft, abnd in lime 9605 ft.

EAST TEXAS WILDCATS

Ellis County—Failure: Lesco, Inc.'s R. S. LeSage 2, 2320 ft snl 330 ft wel Hugh Lucky sur, abnd limey-shale 2555 ft.

Freestone County—Failure: Geo. H. Anderson et al's Gussman & Hess 1, 467 ft out sec 264.39-ac tr, or 467 ft wel 2650 ft nsl of P. Navarro sur, elev 366 ft, Austin Chalk 3400-3738 ft, Woodbine series 4134 ft, sand 4145 ft, abnd 4279 ft.

Wood County—Failure: Sohio's Little Sandy H&F Club 1, 500 ft nsl 1000 ft ewl of James Hamblin sur, elev 308 ft, Pecan chalk 3017-3101 ft, Austin 4530-4657 ft, Woodbine 5046 ft, Comanche lime 5668 ft, Goodland 7006 ft, Paluxy 7116 ft, abnd 7175 ft.

EAST TEXAS NEW PAY TEST

Wood County—Winnsboro Deep Pay Discovery: Gulf's Hornbuckle 1, 814 ft fr m/w/wl 850 ft fr m/n/sl Ben Lee sur A-376, 2500-ft n by w of 7990-ft disc, elev 510 ft, Georgetown 5127 ft, Paluxy 6282 ft, Glen Rose 6675 ft, massive anhy 7778-7922 ft, Bacon 7932-55

The OIL WEEKLY'S TRADING POST

USED EQUIPMENT FORUM

CLASSIFIED ADS . . . EQUIPMENT . . . SERVICES . . . PERSONNEL

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2" or 3" roadway lumber
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■ FOR SALE: Two Emsco Drilling Rigs—1 Steam, 1 Power—5,000' 4½" 16.60 New Pipe with Hughes FH Joints, also used 3½" and 6⅝" Drill Pipe. H. D. Biles, Box 710 Fort Worth, Texas. Phone 6-5401.

ELECTRICAL EQUIPMENT

Amt.	Name & Type
2	Bases, for Westinghouse motors.
2	Bases, for General Electric motors.
11	Boxes, Relay panel #1777176.
1	Box, Relay panel #1777446.
23	Bushings, Conduit, various sizes.
10 ft.	Cable, Armored, #14.
125 ft.	Conduit, ½" to 1½".
6	Condulets, 1½".
40	Couplings, Galv, Conduit, various sizes.
24	Covers, Unilet, various sizes.
11	Ells, Factor, 1½".
75	Insulators, various types.
3	Motors, Allis Chalmers, 40-15 H.P., 440-V, 60 cycle, 3 Phase, 50/18.7 Amp., 860 RPM, Induction.
1	Motor, Allis Chalmers, 50 H.P. with Slide Rails.
2	Motors, General Electric, 40-15 H.P.
2	Motors, Westinghouse, 35-15 H.P., 440-V, 60 cycle, 3 Phase, 49/25 Amp., Induction.
6	Nipple, 1½" x 9" Conduit.
4	Pins, Insulator, Locust.
8	Racks, Secondary.
2 Sets	Rails, Slide for A. C. Motors.
2	Receptacles, ½" #7660 Unilet.
10	Relays, 30 and 65 Amp.
3	Stations, Push Button, #2940.
3	Switches, 2 Pole entrance, 30 Amp., 125 Volt, #5791.
4	Switches, Magnetic, 440-Volt, 60 Cycle.
13	Switches, Trumbull, D.T., #35353.
5	Switches, Trumbull Entrance, #40353.
6	Transformers, General Electric, 37½ KVA.
14	Transformers, General Electric Air Cooled, 500-Volt.
16	Unilets, ½".

Above equipment all removed from pumping wells and for sale as is in one lump sum. Located within sixty miles of San Antonio. Address: Box 4, c/o The Oil Weekly, Houston, Texas.

■ **FOR SALE: Two Heine water tube boilers, 150 H.P. $1,400 each, f.o.b. Cuero. Boilers were retubed last year at a cost of $2,400. Can be seen in operation now.**
Cuero Cotton Oil Company, Cuero, Texas.

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Regular classified advertisements for this special section, set in type this size without border, take flat-rate of 7 cents per word for the first insertion and 5 cents per word for each subsequent insertion of same copy. Display advertisements for this section, set in suitably larger type with ruled border, are $5.00 per inch for the first insertion and $4.00 per inch for subsequent insertions. Remittance must accompany copy which should be sent to:
Trading Post Section, The Oil Weekly
P. O. Box 2608 Houston 1, Texas

FOR SALE

■ About 28,000-acre block So. Ga. leases for sale. Send or come and investigate. Owners care box 364, Waycross, Ga.

DRILL PIPE FOR SALE
9,000 feet 3½" O.D., Range 2, Drill Pipe with Hughes Acme Regular Tool Joints.
4,200 feet 3½" O.D., Range 1, Drill Pipe with Hughes Acme Regular Tool Joints.
6,600 feet 2⅜" O.D., Range 1, Drill Pipe with A.P.I. Full Hole Tool Joints.
Located in Houston.
Telephone J-2-1466 or T-6268, P. O. Box 1261, Houston, Texas.

HELP WANTED

■ WANTED: By major oil company, 5 tool pushers for Venezuela. Salary commensurate with experience and ability. Single status. Must have certificate of availability. Address: Box 16, c/o The Oil Weekly, Houston, Texas.

■ WANTED: Two micropaleontologists for Bogota, Colombia, South America. Major oil company. Salary commensurate with ability and experience. Must have certificate of availability. Address: Box 17, c/o The Oil Weekly, Houston, Texas.

SITUATIONS WANTED

■ Man with fifteen years experience as roughneck, driller and toolpusher, steam and mechanical rigs, desires connection with oil company operating outside United States. Single. Read and write English and Spanish. Do some mechanical drawing. Now employed but immediately available. Address: Box 15, c/o The Oil Weekly, Houston, Texas.

■ Man with 25 years oil field experience wants production job. Electrical and Diesel experience. Graduate mechanical engineering. Last job Production Superintendent. Can furnish references. Will be released from Government employ about November 1st. Address: Box 18, c/o The Oil Weekly, Houston, Texas.

AVAILABLE TO A PROGRESSIVE ORGANIZATION
Executive
20 years with major oil companies. Manager of Purchase and Store departments. Management engineering, field store auditing. Background of practical field work. For the past 2½ years have held responsible posts concerned with procurement for the Armed Forces.
Address:
Box 19, c/o The Oil Weekly, Houston, Texas

BUSINESS OPPORTUNITIES

■ **CAPITAL SEEKERS: Interested in raising $25,000 or more should write to Amster Leonard, Fox Bldg., Detroit 1, Michigan.**

BUSINESS OPPORTUNITY
Large Independent Oil Company desires high class business man who has contacts with wealthy clientel in the East to place meritorious drilling blocks having good geology. Position permanent and amply remunerative depending upon results. Prefer man experienced in oil business. State reference, age, and salary required. Address P. O. Box 1075, Dallas, Texas.

WANTED TO BUY

■ WANTED: 36L or 24L Bucyrus-Erie Spudder with or without tools. G. Bradford, 4834 E. 6th St., Kansas City 1, Missouri.

NOTICES

■ GEORGIA OIL REPORTS: 6 mo. sub. $6. Get posted. Keep posted. Also Base and County maps So. Ga. and North Fla. C. W Deming. Waycross, Ga.

ft, Hill sand 8034 ft, Gloyd 8165 ft, Pittsburg 8605 ft, Travis Peak 8994 ft, flow 72 bbls 46.9-gr, natural via ⅛-in, Gloyd perf 8210-40 ft, td 9141 ft.

NORTH TEXAS WILDCATS

Clay County—Failures: Continental's Reynolds 1, 990 ft wel 330 ft nsl blk 14, Marion CSL sur A-308, elev 956 ft, Bend 5690 ft, abnd 6059 ft.

Shappell Oil Co.'s Roberts 1, 150 ft nsl and 450 ft wel blk 74, Parker CSL, abnd 1987 ft.

Cooke County—Failure: Texas Co.'s Lynch 1, 330 ft out nwc lot 3, sec 6, University Lge-J. W. Blankenship sur A-1332, elev 772 ft, abnd 5670 ft.

United States Wildcat Starts

ALABAMA

Choctaw County: John Green's Lucille G. Dawsey 1, 666 fr wl c sw se 20-10n-4w, prep to move in.

ARKANSAS

Columbia County: G. H. Vaughn's Jackson 1, sw¼ 8-16s-21w, lcn.

Union County: Kerlyn Oil Co.'s Crossett Lbr. Co. 1, c sw sw nw 9-19s-10w, lcn.

CALIFORNIA

Fresno County: Superior Oil Co.'s Hanneman 1, se ne 30-15-17, San Joaquin area, lcn.

Imperial County: Amerada's Veyseg 1, se se 9-13-14, Brawley area, lcn.

Kern County: Gene Reid Drlg. Co.'s Winston 1, ne se 27-27-27, Premier-Poso area, lcn.

Rothschild-Bender Operation's Anderson 1, se ne 20-29-21, outpost Sheep Springs area, lcn.

Superior Oil Co.'s Crocker 1, sw nw 13-29-21, Sheep Springs area outpost, dr.

Western Gulf's K. C. L. A-44-22, se nw 22-29-26, Greeley area outpost, lcn.

Los Angeles County: Texas Co.'s Garnier 1, ne ne 35-1-10, San Jose Hills area, lcn.

San Luis Obispo County: Richfield Oil Corp.'s Temblor Unit 2-2, ne ne 32-12-25, Temblor Hills, rig.

Solano County: A. Oberholtz's No. 1, se se 22-4-1, Rio Vista outpost gas test, lcn.

FLORIDA

Leon County: Stanolind's St. Joe Paper Co. A-1, 50 nw c ne ne 15-2s-2e, dr 330 ft.

ILLINOIS

Clark County: Gant Gallatin's Cole 1, sw sw sw 2-10n-13w, lcn.

Coles County: Sam J. Burkett's Pinnell 1, sw nw ne 12-12n-14w, lcn.

Jasper County: Pure's Kauffman 1, ne se se 27-6n-10e, lcn.

Jefferson County: Deep Rock's Interstate Coal Co. 1, se sw nw 4-4s-1e, lcn.

Lawrence County: Ed Giech et al's Price 1, se se sw 31-3n-12w, lcn.

Madison County: L. Alck's Gonterman 1, ne nw nw 21-4n-7w, dr 210 ft.

St. Clair County: Sinclair Wyoming's Baer 1, sw nw nw 23-2n-6w, lcn.

White County: Amisco, Inc.'s Austin 1, ne ne sw 28-6s-9e, dr.

KANSAS

Barton County: Black-Marshall's Thompson 1, nwc 6-17s-12w, c&p.

Gove County: Transwestern et al's Jones 1, nwc 9-15s-31w, mirt.

Phillips' Heier 1, ne ne se 34-11s-28w, lcn.

McPherson County: Williams & Morine's Henne 1, 4-17s-1w, dr 165 ft.

Ness County: Sinclair Prairie's Strauch 1, nw sw ne 4-18s-22w, lcn.

Pawnee County: Ira Keith's Wendell 1, sec 24-21s-19w, mim.

Phillips County: Derby et al's Beckman 1, swc se 36-3s-19w, lcn.

Reno County: Simpson Noble's Voth 1, ne sw se 7-22s-4w, lcn.

Continental et al's Hodge 1, ne ne sw 15-22s-8w, mirt.

Rice County: Nelson Drlg.'s Allison 1, nec 23-19s-6w, lcn.

Rooks County: Globe Oil's Fed Farm Mortgage 1, nwc ne 20-9s-19w, lcn.

Stafford County: Cities Service's Jenkins 1-B, swc se 4-25s-12w, mirt.

Trego County: El Dorado Rfg.'s Benson 1, nw nw sw 21-12s-22w, lcn.

KENTUCKY

Henderson County: Ohio's Hornbrook 1, 4-P-25, dr 315 ft.

NORTH LOUISIANA

Lincoln Parish: Big West Dr. Co.'s N. B. Gill Est. 1, 35-20n-2w, dk.

SOUTH LOUISIANA

St. Landry Parish: Mid-Continent's John Sonnier 1, 330 fr n&wl s ½ of 31-5s-4e, lcn 10,000-ft test.

MICHIGAN

Arenac County: Gordon Oil Co.'s Staebler 1, ne se ne 10-20n-6e, lcn.

Clare County: Sun's McClure 1, se ne se 22-20n-3w, lcn.

Isabella County: Carter Oil Co.'s Fish 1, ne sw se 4-13n-6w, dr.

Montcalm County: Sun's Martens 1, se nw nw 36-11n-8w, rig.

Roscommon County: Sun's State A-1, n½ nw ne 23-24n-2w, rig.

Sun's State B-1, n½ nw nw 24-21n-4w, lcn.

St. Clair County: Tamblyn Development Co.'s Newell 1, nw nw sw 3-6n-16e, lcn.

Tuscola County: Elmer Brehm's Charlton 1, ne ne se 34-11n-8e, dr.

Wexford County: Ranch Oil Co.'s Browning 1, s½ se se 11-23n-11w, dk.

MISSISSIPPI

Warren County: Sinclair Wyoming's Mary G. Blake 1, 330 fr s&wl nw 7-17n-4e, lcn.

MISSOURI

Platte County: Rupert's Fee 1, se ne nw 22-51n-34w, dr 124 ft.

NEW MEXICO

De Baca County: Frank Griggs and John Darden's State 1, c ne ne 11-4n-26e, sp and sd for rotary on 5000-ft contract.

Lea County: Ohio Oil Co.'s W. H. Jones 1, c sw se 19-19s-39e, lcn 7500-ft Clear Fork test.

Vickers Pet. Co.'s State 1, c lot 8, 2-16s-34e, sp and sd for 5300-ft San Andres test.

Stanolind's State 1-M, c nw nw 32-19s-35e, revised lcn, rur.

Lincoln County: Stanolind et al's State-Snowden & McSweeney Co. 1, c nw nw 10-12s-18e, lcn for deep test on Picacho 20,471-ac unit.

OKLAHOMA

Cleveland County: Gulf's Price 1, ne se 17-9n-3w, lcn.

Calif. Co.'s Wilson 1-A, ne ne se 27-10n-1e, rur.

Garvin County: E. J. Kubat's Newburn 1, ne ne sw 18-4n-2e, dr 280 ft.

Kiowa County: Bill Palmer et al's Gilmore 1, sw sw nw 20-7n-20w, sd 60 ft.

Lincoln County: Herndon Drlg. et al's Honeycut 1, se se nw 9-13n-3e, rig.

McClain County: Carter's M. T. Johnson 1, c sw ne 30-8n-2w, cellar.

Okfuskee County: Northern Ordnance's Graham 1, nw nw nw 8-11n-11e, rur.

Texas Co.'s Replogle 1, sw nw ne 33-12n-9e, rur.

Oklahoma County: Stanolind's State 1, ne se 36-11n-4w, bldg rig.

Osage County: Wilcox Oil Co.'s Osage 1, ne sw sw 10-22n-8e, rum.

Devonian Oil's Osage 1, se nw nw 28-29n-7e, lcn.

Tillman County: Gulf's Copeland 1, ne nw 31-1s-18w, c&p.

WEST TEXAS

Brewster County: M. L. Hopson et al's Hopson 1, 200 ft out nwc D&W Ry. sec 113, blk G-1, sp & sd.

Hockley County: Texas Co.'s L. Y. P. Montgomery 1, 580 ft out nec labor 19, Lge 70, Val Verde CSL sur, spd on 5000-ft San Andres test.

WEST CENTRAL TEXAS

Johnson County: F. C. Hines et al's H. B. Van Zandt 1, 330 ft fr sel 900 ft fr nel 81-ac tr, Urbano Mendoz sur A-543, dk for 5000-ft Ellenburger test.

Jones County: Anderson-Prichard Oil Corp.'s Tom Parkinson 1-A, 1050 ft ewl 1200 ft nsl of 125-ac tr, or 1800 ft ewl 8900 ft snl Macaela Fragosa sur No 209, lcn 3400-ft rotary test.

Palo Pinto County: W. K. Gordon et al's C. B. Long 1, 990 ft snl 660 ft wel T&P Ry. 71, blk 2, lcn 3800-ft cable test.

Shackelford County: Shell's K. F. Leschber 1, 330 ft snl 995 ft wel sw¼ sec 34, Blind Asylum Lands, lcn 4750-ft Ellenburger test.

SOUTH CENTRAL TEXAS

Bastrop County: Continental's Mikulenka 1, 1790 s of nl 380 w of el of 97.79-ac lse, William Barton sur, 5 mi se of Kirtley, lcn 4200-ft test.

Bexar County: G. O. Reinhardt's Geo. D. Reinhardt 1, 101 fr nel 501 fr sel 26-ac lse, W. Small sur 26, lcn.

SOUTHWEST TEXAS

Duval County: M. E. Davis' L. G. Denman 1, (OWDD) 1230 fr nl 6000 fr el blk 20, Realitos subdvn Copita Farm & Garden Trs, Santos Garcia Gr A-1985, elev 445 ft, abnd 5521 ft, 6500-ft test.

Fred W. Shield-J. W. Gorman's Altha G. Black 1, c 180-ac lse, J. Pointevent sur 129, lcn 4500-ft test.

Webb County: Dulup Oil Co.'s Bruni 3, 990 fr e&nl 360-ac lse, Aldercas Gr, Brown subdvn, blk 46, 12 mi s of Miranda City, elev 843 ft, lcn 1800-ft test.

LOWER TEXAS COAST

Caldwell County: Pulaski Oil Co.'s W. J. Richardson 1, 560 ne of swl 720 n of sel 163-ac tr, A. Churchill sur, 6 mi sw of Lockhart, lcn 2000-ft test.

Dewitt County: Arkansas Fuel Oil Co.'s Ernest Richter 1, 1600 e of wl 3300 s of nl George W. Brooks sur, 460-ac tr, lcn 9000-ft test.

Rowan & Hope-Ray Ranger's J. C. Wallis 1, 660 out of nec 204-ac lse, H. P. Cox sur on Ralph Fair's blk, tentative lcn.

Hidalgo County: Hamman O&R Co.'s John and Geo. Hamman 1, 8148 fr el 13,401 fr nl 24,000-ac lse, San Salvador del Tule Gr, 1½ mi ne of Monte Christo, elev 165 ft, lcn 7500-ft test.

Jackson County: Moore & Ahern's A. E. Westhoff 1, 330 out of swc of 80-ac lse in blk 1, Joseph Rector sur A-62, 4 mi s of Edna, lcn 7000-ft test.

Jim Wells County: Rodney Delange-Earl Howe's S. McCarley 1, 660 out of m/wc lot 6 blk A, Bode subdvn of Wade Rch, 1½ mi sw of Sandia, lcn 5000-ft test.

Live Oak County: Texas Co.'s Mrs. J. K. Cochran 1, 467 fr nw&swl 956-ac lse, J. C. Wright sur, 5 mi e of Oakville, lcn 8500-ft test.

Nueces County: L. M. Lockhart's Ada T. Wright 1, 467 fr nl 1320 fr wl 307-ac lse, Vinvente Lopez de Herrera Gr, 3 mi n of Banquete, lcn 5500-ft test.

TEXAS GULF COAST

Chambers County: Jack Frazier's Eliz. H. Moore Est. 1, 1550 s 330 w of nec sect 29 T&NO sur 206, 474-ac lse, 8 mi nw of Winnie, lcn 9000-ft test.

Texas Co.'s Josephine Connerly 1, 660 fr s&wl se¼ HT&B sur sect 92, 320-ac lse, lcn 10,500-ft test.

Harris County: Glenn McCarthy's H. Reichart 1, 350 fr nwl 461 fr nel 63.6-ac lse 461 sw of nel A. Scales sur 687, Spring area, lcn 7000-ft test.

Jefferson County: Shell's McFaddin 1, 660 fr nely&nwly lines N. W. Smith 160-ac sur A-201, 7147-ac lse, Port Acres area, lcn 9000-ft test.

Sun's J. W. Mackie et al Pool 1, 1208.7 fr wly/el 660 fr sly/sl 222-ac lse, 450 fr sl A. Horton sur A-29, 2050 ne of Shell's Carpenter 6, Nome n outpost 4800-ft test.

Matagorda County: Hewit & Dougherty's J. J. Fortenberry 1, 660 fr s&wl of 40-ac tr sw 40-ac of 160-ac tr, I&GN sur, 5 mi w of Midfield, lcn 7500-ft test.

Skelly's G. P. Hardy 1, 1140 fr wl 630 fr sl 450 fr nl 131-ac lse, in blk 3 I&GN sur 4 and H. Goslin sur 2, 1 mi e of Bay City, lcn 10,000-ft test.

Wharton County: Dr. and Exploration Co.'s T. W. Gresham 1, 330 fr n&wl sect 22 Otis Perrin sur A-474 239-ac lse, lcn 6500-ft test.

EAST TEXAS BORDER COUNTIES

Panola County: Arkansas Louisiana Gas Co.'s Ernest Langford Unit 1, 330 fr wl 666 fr nl of s½ of 679-ac lse, W. Rich sur, lcn.

EAST TEXAS

Hunt County: Hollandsworth Dr. Co.-Stanolind's C. H. Kimbell 2, 80 ft fr m/e/el 1675 ft fr m/e/sl of 309½-ac tr, or 4250 ft wel 1690 ft nsl of James Cole sur A-152, lcn Paluxy test.

Robertson County: Hamman O&R Co.'s P. C. Gibson 2, 1000 ft fr sel 1825-ac tr 2650 ft ne of Brazos River, Jesse Webb sur, 950 ft ne of 5017-ft Edwards failure, lcn.

Wood County: Delta Dr. Co. et al's Mosley 1, 400 ft ewl 295 ft fr n&sl 39-ac unit, or 1790 ft ewl 2200 ft nsl Seth W. Mitchell sur A-386, dk for Woodbine test.

NORTH TEXAS

Archer County: Staley Oil Co.'s E. Colgan 1, 2190 ft ewl 1470 ft nsl of 240-ac in D. A. Murdock sur A-284, lcn 1700-ft rotary test.

Clay County: Texas Co.'s L. P. Hapgood 1, 660 ft out sec blk 84, Marion CSL sur A-308, lcn 7000-ft Ellenburger test.

Bradley & Suddath's Mosier 1, 1050 ft wel 150 ft snl blk 74, Parker CSL sur, lcn 350-ft cable test.

WESTERN CANADA

Alberta Foothills Belt—New Valley: Royalite Oil Co.'s New Valley 1, c lsd 2 22-21-3w5th, clearing site.

Southern Alberta Plains—Raymond: Imperial Oil's Raymond 1, nw lsd 7 16-6-20w4th, ru.

Central Alberta Plains—Lloydminster: W. G. de Koch's Marina 1, se lsd 16 27-49-1w4th, dr.

☆

WILLIAM H. WHITTEKIN, vice president of the Oil Well Supply Company, Dallas, has retired after 30 years of service. A former teacher and driller, Whittekin was cited in World War 1. He became vice president of the firm in 1932.

JAMES K. MURPHY has been named chief geologist for Norbla Oil Company and will direct exploration.

Squeaks from the Bull Wheel

Not That Crazy

Visitor (at asylum): "Do you have to keep the women inmates separated from the men?"

Attendant: "Sure. The people here ain't as crazy as you think."

Careful, There

The guy who claims his gal is cold should remember that so is dynamite until you start fooling around with it.

Home Work

A young man surprised his girl friend by calling earlier than usual and found her mending her panties.

When asked what she was doing, she nonchalantly replied: "Mending the curtains for my sitting room."

Poet's Corner

No wonder the little duckling
Wears on his face a frown;
He has just now discovered
His first pair of pants are down.

Be Good or Quiet

An honest confession is good for the soul but bad for the reputation.

Say It Isn't Sew

"Darling, when we are married I am going to cook and darn all your socks."

"Oh, that won't be necessary, my pet. Just darn them."

Ditch-Digging Drama

"Help, help, queek."

"Whatsamat?"

"Tony, he stick in da mud."

"How far in?"

"Up to da knees."

"Aw, let him walk out."

"He no can walk, he wrong end up."

Not Edible

"Tell me your name," said the wolf to the waitress.

"Pearl."

"A beautiful name. Are you the pearl of great price?"

"No, I'm the pearl cast before swine."

Definition

Diplomacy is the art of letting the other fellow have your own way.

His Poor Mother

Mother: "Daughter, didn't I tell you not to let that strange man come over to your apartment last night? You know how things like that worry me."

Daughter: "But I didn't. I went over to his apartment. Now let HIS mother worry."

Get a Hump On

"I suppose I'm only a little pebble on the beach of your life?"

"Yes, but you might stand a chance if you were a little bolder."

Make It Legal

"You've already had leave, Private, to see your wife off on a journey, for your mother-in-law's funeral, for your little girl's measles and your boy's christening. What is it now?"

"I'm to get married, sir."

New Address

"Doctor, what are my chances?"

"Oh, pretty good, but don't start reading any long continued stories."

Phooled Him

A farmer once called his cow "Zephyr."
She seemed such an amiable heifer.
But when he drew near
She bit off his ear.
And now he is very much dephyr.

Gotkool
WATER CANS
& COOLERS
GOTT Water Coolers are the convenient way to keep drinking water handy to the worker, protect it from impurities. Their exclusive construction keeps water cool for long periods. Snug fitting large removable top, handy non-leaking push button faucet. GOTT Water Cans for handy field use. Your Supply Store has them, get one today! . . . .
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Made in 2, 3, 5, 8, 10, 15 and 20 gallon sizes.
H. P. GOTT MFG. CO.
WINFIELD, KANSAS
GOTKOOL WATER CAN
KEEP PURE DRINKING WATER ALWAYS HANDY

BE SURE TO CHECK . . . .

Trading Post Section

ON PAGE 91 OF THIS ISSUE

Because of the scarcity of certain types of new equipment and the fact that some operators may have a surplus of some items and a serious shortage of others, this **Used Equipment Forum** is performing a valuable service to operators in locating needed used materials or disposing of surpluses that may be needed by others.

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NO-SMOKE
STANDCO BRAKE LINING
for the easiest brake known. it "feeds off" evenly. Standco never scores brake rims. See page 2808 Composite Catalog.
Standco Brake Lining Co.
HOUSTON

Notes for the Equipment Buyer and User

All Service Field Unit

FRANKS MANUFACTURING CORPORATION

Franks Manufacturing Corporation, Tulsa, has developed an improved Model 7000 double-drum mounted, "All Service" unit for oil field work. The outfit was designed for extreme adaptability and economy in rig-up and tear-down, transportation, and cost of erecting permanent derricks. Completely portable, it carries a telescoping derrick with a maximum height, when expanded, of 96 feet. The derrick telescopes and folds over the cab in such dimensions that it is available for transportation either over traveled highways or average oil field roads.

Design of the unit was concentrated upon providing equipment, completely portable, which would answer any servicing requirement. Manufacturer's literature says the unit will: 1. Drill, with spudder, from grass roots to 3500 feet. 2. Drill, with rotary, from grass roots to 5000 feet (with independent driven pump). 3. Pull rods and tubing to 8500 feet. 4. Drill-in wells to 7500 feet. 5. Spudder clean-out and deepen to 7000 feet. 6. Ream, reverse-circulate, core, combat paraffin mechanically and do the unexpected job at the producing well.

The power unit is variable upon specifications, and may be up to 875 cubic inches, thus providing all the engine power necessary to work normal depths and to 10,000 feet where rod or tubing jobs are required. Four or five sheaves may be used with drum space for a maximum of 17,531 feet of ½-inch line on the main drum and 13,415 feet on the sand-reel. The drums may be equipped either with the standard 10-inch brakes or 8-inch when required.

Franks "All Service" Oil Field Unit

Joins Worthington Firm

Worthington Pump and Machinery Corporation, Harrison, New Jersey, announces that C. W. Camp, with Crocker-Wheeler Electric Manufacturing Company for 38 years, is now associated with Worthington as consulting electrical engineer. Camp, who replaces the late Harry Wood, will assist in electrical application problems for all Worthington sales divisions and district offces.

Worthington also announces appointment of William J. Van Vleck as manager of its Atlanta office, succeeding Edward Stauverman. Van Vleck entered Worthington's employ in 1924 and since 1938 he has been assistant manager of the Philadelphia district office.

Chief Engineer Appointed By Lubri-Gel Products

Lubri-Gel Products Company, McCracken, Kansas, and Sweetwater, Texas, announces appointment of Mark Olson as chief engineer. He was formerly associated with Stanolind Oil and Gas Company as mud engineer. He was graduated from the New Mexico School of Mines with a degree in petroleum engineering.

Mark Olson

The company specializes in oil-field drilling mud and Olson will direct application of this product to specific drilling problems.

Aide to Chief Engineer Named by Mack Trucks

Mack Trucks, Inc., Empire State Building, New York, has named William M. Kauffman assistant to the chief engineer in charge of Diesel engine development.

W. M. Kauffman

He has had 20 years experience in Diesel development, and was previously assistant chief engineer of the engine research and development division of Worthington Pump and Machinery Company, and chief development engineer of the National Transit Pump and Machine Corporation.

Branch Office Opened

Penn Electric Switch Company, Goshen, Indiana, has opened a branch sales office in the Wilson Building, Dallas.

The office will be managed by Ray P. Waite, a graduate mechanical engineer, who also has had considerable experience in electrical and chemical engineering.

New Magazine

Oil Well Supply Company, United States Steel Subsidiary, Mercantile Bank Building, Dallas, has published the first issue of "Oilwell News," a magazine for Oil Well Supply Company employes. This issue is devoted to a history of the company.

Water Analysis Outfit

CHIEF CHEMICAL CORPORATION

Chief Chemical Corporation, 55 West 42 Street, New York 18, has developed the Aero-Titrater, a device for rapid water analysis. The apparatus was designed to provide a precise method for the determination of hardness, calcium and magnesium in waters, both industrial and potable.

Air agitation eliminates shaking by hand. Accuracy is comparable with gravimetric methods and substances ordinarily present in water do not interfere with results.

The device makes use of a new endpoint, based on the foam-meter principle. This endpoint is said to be unmistakable and is reproducible with a high degree of precision. Determinations are made within ten minutes. The operation is foolproof and gives identical results with different operators.

The instrument is supplied calibrated. There are no moving parts. All vital parts are of plastic construction. Samples of 50 ml. or less are required. It is claimed the outfit can be used with samples which contain chlorides up to 2000 ppm, sulphates up to 1000 ppm, and large iron concentrations.

National Supply Appoints Midwest Sales Manager

The National Supply Company announces appointment of K. O. Hoevel as division sales manager for the Midwest Division, with headquarters at Tulsa.

K. O. Hoevel

Hoevel entered the service of the National Supply Company in 1933 as a storeman at Seminole, Oklahoma. In 1935, he was transferred to the Torrance, California, plant.

Later he returned to the Kansas fields as field salesman and rotary serviceman and subsequently became sales engineer at division headquarters in Tulsa. In 1941 he moved to the Toledo plant in a supervisory capacity in the construction of propulsion gears for United States Naval craft. He is a graduate of Missouri School of Mines, in mechanical engineering.

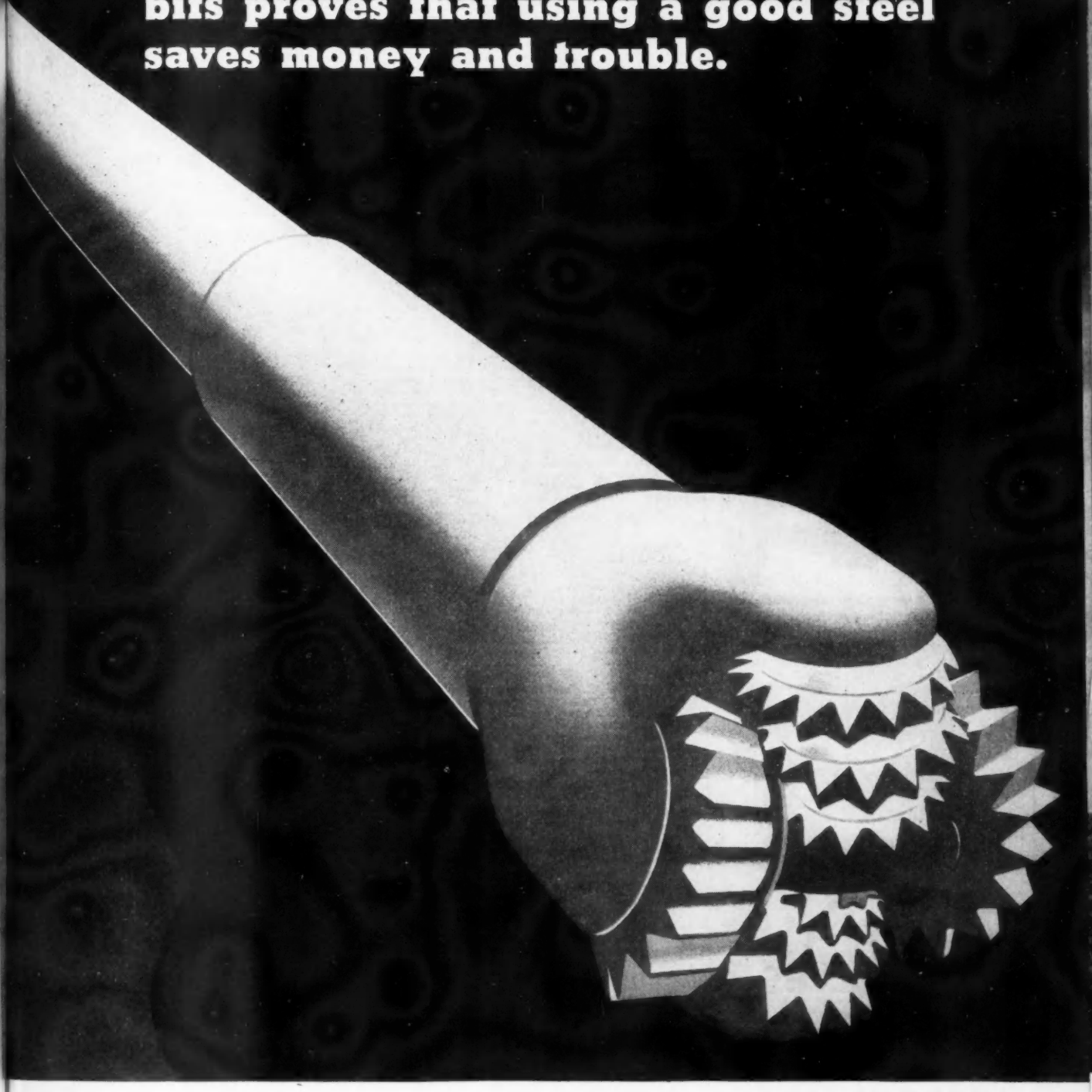
Eastman District Office

Eastman Oil Well Survey Company, Dallas, has opened a district office at 405 West First Street, Odessa, Texas. H. R. Benson, formerly resident engineer in Odessa, has been named district superintendent for the West Texas area.

Tap Booklet Issued

Landis Machine Company, Waynesboro, Pennsylvania, has published a bulletin, G-49, describing the Landis Style ALT collapsible tap.

Performance of molybdenum steel rock bits proves that using a good steel saves money and trouble.



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Orbit Gear Operated Master Valve

This valve can be furnished thru all fabricators of Xmas Trees or thru any of your local supply stores at a price comparable to that of leading plug valves, **YET,** this valve requires no lubrication to effect a seal.

See 1944 Composite Catalog

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OIL WELL IMPROVEMENTS COMPANY

TULSA, OKLAHOMA

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Phone Fairfax 0057
Warehouse 1121 Rothwell, Sect. 15, Houston

Earl F. Warren, Phone 919-W, Alice, Texas

Rex E. Galloup, Phone 6436, Lubbock, Texas

C. D. WATSON, director of The Carter Oil Company, has been named chairman of the state board of registration for engineers for Oklahoma, succeeding Guy Treat. Elected directors were Dr. E. C. Baker of A. & M. College; Dr. C. V. Jones of the University of Oklahoma, and W. H. Steuve of Oklahoma Gas & Electric Company.

CAPTAIN JAMES ERWIN, former land man with the Slick Oil Company, San Antonio, Texas, is in charge of providing oxygen for troops in the Ninth Air Force, and servicing their instruments on P-38 Lightning Fighters. He has served in many of battles of France, Belgium and Germany.

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